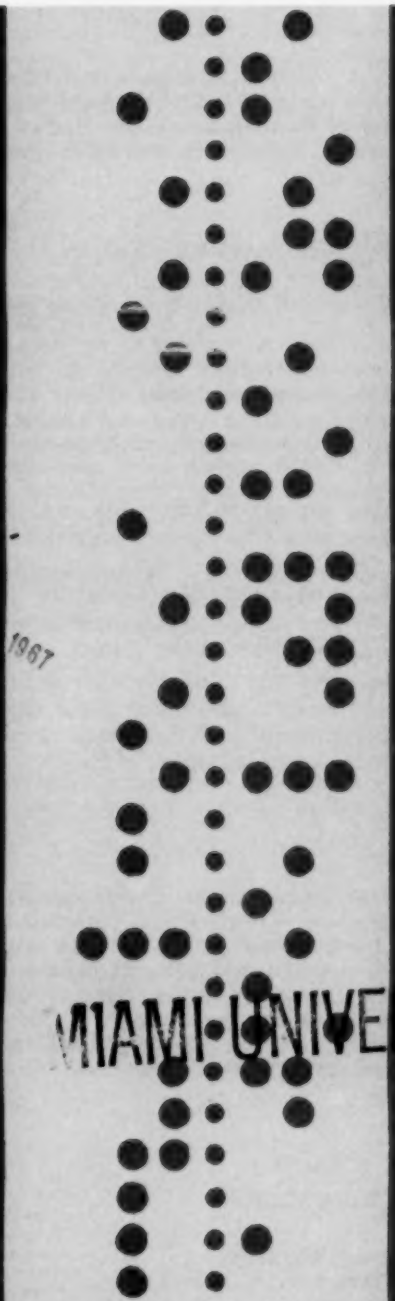
C 41.21: 67/7

April 10, 1967

U.S. GOVERNMENT

RESEARCH & DEVELOPMENT REPORTS



1967

A Semi-Monthly Abstract Journal

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INDEX

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U.S. DEPARTMENT OF COMMERCE
Alexander B. Trowbridge, Acting Secretary

CLEARINGHOUSE FOR FEDERAL SCIENTIFIC
AND TECHNICAL INFORMATION
Bernard M. Fry, Director

Contents may be printed freely. Mention of source will be appreciated. Use of funds for this publication approved by the Director of the Bureau of Budget, June 22, 1966.

FOREWORD

U. S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS is produced by computer from machineable records generated by four Federal agencies which announce R&D reports. Machineable records from the Atomic Energy Commission, the National Aeronautics and Space Administration, the Defense Documentation Center and the Clearinghouse for Federal Scientific and Technical Information are merged to produce USGRDR. All of the reports announced in USGRDR are indexed in the companion index, GOVERNMENT-WIDE INDEX TO FEDERAL RESEARCH & DEVELOPMENT REPORTS.

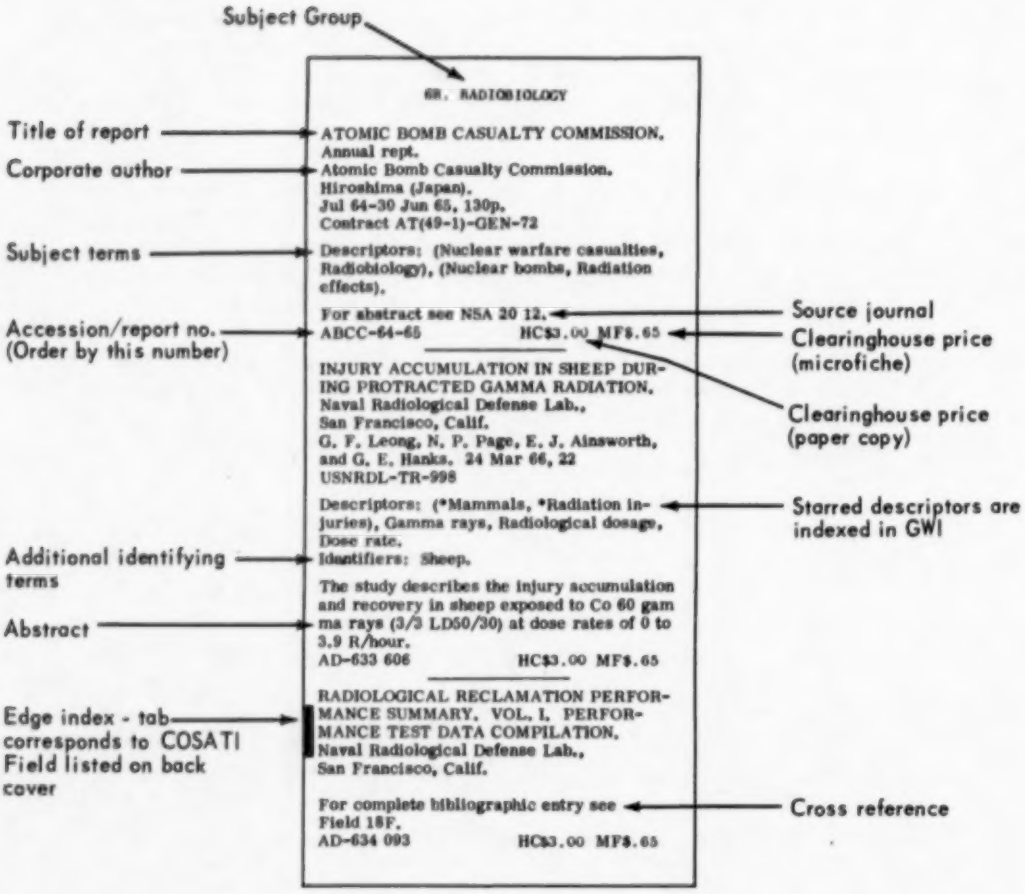
There are some format errors and inconsistencies in this journal resulting from the machine merger of the data generated by several agencies. Efforts are being made to correct these inconsistencies. The agencies involved are working with a task group of the Committee on Scientific and Technical Information to develop improved interagency standards which will eliminate these problems.

The Clearinghouse is striving to improve the content and format of USGRDR so that it will become increasingly valuable to the general public as an announcement tool and order guide. Comments and suggestions for improvement are invited and should be directed to the Director, Clearinghouse, Springfield, Va. 22151.

USGRDR FORMAT

Reports are announced under 22 subject categories called FIELDS. Each FIELD is divided into subcategories called GROUPS. Documents are listed alphanumerically by accession number within the GROUP. This classification system was adopted by the Committee on Scientific and Technical Information (COSATI) of the Federal Council on Science and Technology. The *COSATI Subject Category List* (AD–621 200) is available from the Clearinghouse at $3.00.

SAMPLE JOURNAL ENTRIES


Subject Group
6R. RADIOBIOLOGY
Title of report
ATOMIC BOMB CASUALTY COMMISSION, Annual rept.
Corporate author
Atomic Bomb Casualty Commission, Hiroshima (Japan).
Jul 64-30 Jun 65, 130p.
Contract AT(49-1)-GEN-72
Subject terms
Descriptors: (Nuclear warfare casualties, Radiobiology), (Nuclear bombs, Radiation effects).
For abstract see NSA 20 12.
Source journal
Accession/report no. (Order by this number)
ABCC-64-65 HC$3.00 MF$.65
Clearinghouse price (microfiche)
Clearinghouse price (paper copy)
INJURY ACCUMULATION IN SHEEP DURING PROTRACTED GAMMA RADIATION,
Naval Radiological Defense Lab., San Francisco, Calif.
G. F. Leong, N. P. Page, E. J. Ainsworth, and G. E. Hanks. 24 Mar 66, 22
USNRDL-TR-998
Descriptors: (*Mammals, *Radiation injuries), Gamma rays, Radiological dosage, Dose rate.
Starred descriptors are indexed in GWI
Additional identifying terms
Identifiers: Sheep.
Abstract
The study describes the injury accumulation and recovery in sheep exposed to Co 60 gamma rays (3/3 LD50/30) at dose rates of 0 to 3.9 R/hour.
AD-633 606 HC$3.00 MF$.65
Edge index - tab corresponds to COSATI Field listed on back cover
RADIOLOGICAL RECLAMATION PERFORMANCE SUMMARY, VOL. I, PERFORMANCE TEST DATA COMPILATION,
Naval Radiological Defense Lab., San Francisco, Calif.
For complete bibliographic entry see Field 18F.
Cross reference
AD-634 093 HC$3.00 MF$.65

CONTENTS

	Page
RESEARCH HIGHLIGHTS	v
RESEARCH & DEVELOPMENT REPORTS	1
REPORT LOCATOR LIST	A

SUBJECT CATEGORY HEADINGS

Use Edge Index on back cover to locate COSATI Field in journal

COSATI FIELD

01 AERONAUTICS

Includes aerodynamics; aeronautics; aircraft; aircraft flight control and instrumentation; and air facilities.

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Includes agricultural chemistry; agricultural economics; agricultural engineering; agronomy and horticulture; animal husbandry; and forestry.

03 ASTRONOMY AND ASTROPHYSICS

Includes astronomy; astrophysics; and celestial mechanics.

04 ATMOSPHERIC SCIENCES

Includes atmospheric physics and meteorology.

05 BEHAVIORAL AND SOCIAL SCIENCES

Includes administration and management; documentation and information technology; economics; history, law and political science; human factors engineering; humanities; linguistics; man-machine relations; personnel selection, training, and evaluation; psychology (individual and group behavior); and sociology.

06 BIOLOGICAL AND MEDICAL SCIENCES

Includes biochemistry; bioengineering; biology; bionics; clinical medicine; environmental biology; escape, rescue, and survival; food; hygiene and sanitation; industrial (occupational) medicine; life support; medical and hospital equipment and supplies; microbiology; personnel selection and maintenance (medical); pharmacology; physiology; protective equipment; radiobiology; stress physiology; toxicology; and weapon effects.

07 CHEMISTRY

Includes chemical engineering; inorganic chemistry; organic chemistry; physical chemistry; and radio and radiation chemistry.

08 EARTH SCIENCES AND OCEANOGRAPHY

Includes biological oceanography; cartography; dynamic oceanography; geochemistry; geodesy; geography; geology and mineralogy; hydrology and limnology; mining engineering; physical oceanography; seismology; snow, ice, and permafrost; soil mechanics; and terrestrial magnetism.

09 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes components; computers; electronic and electrical engineering; information theory; subsystems; and telemetry.

10 ENERGY CONVERSION (Non-Propulsive)

Includes conversion techniques; power sources; and energy storage.

COSATI FIELD

11 MATERIALS

Includes adhesives and seals; ceramics, refractories, and glasses; coatings, colorants, and finishes; composite materials; fibers and textiles; metallurgy and metallography; miscellaneous materials; oils, lubricants, and hydraulic fluids; plastics; rubbers; solvents, cleaners, and abrasives; and wood and paper products.

12 MATHEMATICAL SCIENCES

Includes mathematics and statistics and operations research.

13 MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

Includes air conditioning, heating, lighting, and ventilating; civil engineering; construction equipment, materials, and supplies; containers and packaging; couplings, fittings, fasteners, and joints; ground transportation equipment; hydraulic and pneumatic equipment; industrial processes; machinery and tools; marine engineering; pumps, filters, pipes, tubing, fittings, and valves; safety engineering; and structural engineering.

14 METHODS AND EQUIPMENT

Includes cost effectiveness; laboratories, test facilities, and test equipment; recording devices; reliability; and reprography.

15 MILITARY SCIENCES

Includes antisubmarine warfare; chemical, biological, and radiological warfare; defense; intelligence; logistics; nuclear warfare; and operations, strategy, and tactics.

16 MISSILE TECHNOLOGY

Includes missile launching and ground support; missile trajectories; missile warheads and fuzes; and missiles.

17 NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES

Includes acoustic detection; communications; direction finding; electromagnetic and acoustic countermeasures; infrared and ultraviolet detection; magnetic detection; navigation and guidance; optical detection; radar detection; and seismic detection.

18 NUCLEAR SCIENCE AND TECHNOLOGY

Includes fusion devices (thermonuclear); isotopes; nuclear explosions; nuclear instrumentation; nuclear powerplants; radiation shielding and protection; radioactive wastes and fission products; radioactivity; reactor engineering and operation; reactor materials; reactor physics; reactors (power); reactors (non-power); and SNAP technology.

19 ORDNANCE

Includes ammunition, explosives; bombs; combat vehicles; explosions, ballistics, and armor; fire control and bombing systems; guns; rockets; and underwater ordnance.

20 PHYSICS

Includes acoustics; crystallography; electricity and magnetism; fluid mechanics; masers and lasers; optics; particle accelerators; particle physics; plasma physics; quantum theory; solid-mechanics; solid-state physics; thermodynamics and wave propagation.

21 PROPULSION AND FUELS

Includes air-breathing engines; combustion and ignition.

22 SPACE TECHNOLOGY

Includes astronautics; spacecraft; spacecraft trajectories and reentry; and spacecraft launch vehicles and ground support.

RESEARCH highlights

Reports of current high industrial interest

Highlighted documents, unless otherwise designated, are sold at the unit price of $3.00 each, 65 cents microfiche.

Categories

	Page
Transportation	v
Optics	vi
Nuclear Technology	vii
Atmospheric Sciences	viii
Human Factors Engineering	ix
Printing, Graphic Arts Photography	x
Space Technology	x
Fluid and Aerodynamics	x
Mathematics	xi
Biological and Medical Sciences	xii
Management Control, Decisions Systems	xii
Data Processing	xii
Electrical	xiii
Testing, Analysis	xiii
Engineering and Construction	xiv

Transportation

DEVELOPMENT OF A HIGH SPEED GROUND TRANSPORTATION SYSTEM in subterranean guideways has been analyzed by scientists of the Celestial Research Corporation. This concept, called the Cryopumped Tube Train, accomplishes a venting system thermodynamically in an enclosed guideway by causing the atmosphere ahead of the moving train to condense onto the walls of the guideway and to reevaporate behind the train. Results of the analysis indicate that the total aerody-

namic resistance to motion of a train at speeds around 400 mph in a close-fitting subterranean tube, evacuated free of air but filled with saturated water vapor at 13 mm pressure, is about two orders of magnitude below the resistance of a conventional flanged wheel-rail suspension system. The researchers suggest a low pressure steam catapult as an effective and economical acceleration system to bring a tube train to cruising speed, although ultimately a choice of propulsion system depends on the suspension system chosen. Solutions to problems such as tube structure and materials and cabin environment maintenance are suggested. The study recommends experimental verification of the theoretical results. . . . .ORDER PB-173 982 -- A FEASIBILITY STUDY OF THE CRYOPUMPED TUBE TRAIN CONCEPT. . . . .Celestial Research Corp. (Celesco Rpt 388-101), So. Pasadena, Calif. for Office of High Speed Ground Transport, Dept. of Commerce, Oct. 66 (recd Feb. 67), 136p.

Optics

A RAY TECHNIQUE for obtaining the variation in the overall intensity distribution within stable optical resonators has been developed by scientists of the Polytechnic Institute of Brooklyn, by extending the geometrical optical approach previously found for empty resonators to general resonators comprising arbitrary arrangements of lenses and convergent or divergent unhomogeneous focusing. An invariant quadratic form involving parameters descriptive of any of the ray-segments which result from a given initial ray-segment leads to a differential equation satisfied by the ray-segments and their envelope in portions of the resonator. The researchers, finding the envelope function in convergent media to be periodically modulated, formulated and solved a maximum-minimum problem for the envelope, and compared results with available solutions of the corresponding electromagnetic problems. They finally analyzed a simple resonator, and correlated envelope characteristics with the stability limits. . . . .ORDER AD-646 354 -- RAYS AND RAY-ENVELOPES WITHIN STABLE OPTICAL RESONATORS CONTAINING FOCUSING MEDIA. . . . .N. Kurauchi and W. K. Kahn, Polytechnic Inst. of Brooklyn (PIBMRI-1313-66), Brooklyn, N. Y., for the Air Force, Jan. 66 (recd Feb. 67), 35p.

A TEMPERATURE REGULATOR FOR LEAD SULFIDE INFRARED DETECTORS has been designed, built, and tested by scientists of Utah State University. The detector itself, temperature sensitive with respect to its specific detectivity, long wavelength cutoff, time constant, and resistance, was the temperature sensing device in the control system. The researchers used cold nitrogen gas to cool the detector to a temperature below the operating point, then warmed the detector to operating temperature by means of a heat exchanger mounted between the cold source and the detector. The device was used to study the energy transfer process which takes place between vibrationally excited nitrogen and carbon monoxide at low pressures. The test determined that the rate constant for the transfer process was between 2.3 and 2.5 microns for the carbon monoxide overtone region. . . . .ORDER AD-646 429 -- IR DETECTOR TEMPERATURE REGULATOR FOR CO VIBRALUMINESCENCE STUDIES. . . . .M. D. Ketchum and D. J. Baker, Utah State Univ., Logan, for the Air Force (AFCRL-66-587), Nov. 66 (recd Feb. 67), 57p.

Nuclear Technology

THE NEUTRON SPECTRUM OF A HEAVY WATER REACTOR has been obtained in an experiment developed by the Ames Laboratory of Iowa State University. Scientists exposed nuclear emulsions in the core of the Ames Laboratory Research Reactor to obtain the fast neutron flux spectrum, ranging from .8 to 5.0 MeV, for comparison with theoretical calculations. Results showed that the spectrum is generally similar to the Watt fission spectrum but with the peak shifted upward in energy to as high as 2.3 MeV. Superimposed on this are small depressions and peaks corresponding to the resonances and anti-resonances in the cross section of oxygen which in turn corresponds to theoretical spectra of oxygen in this range. Concurrent with the experiment was the development of a theoretical approach to the neutron spectrum. . . . . ORDER IS-1448 -- DETERMINATION OF FAST NEUTRON SPECTRA IN A HEAVY WATER REACTOR USING NUCLEAR EMULSIONS. . . . . J. R. Youngblood, Ames Laboratory at Iowa State Univ. of Science and Technology, for the AEC, Sept. 66, 23p.

THE ELECTRON-CAPTURE AND WEAK ALPHA DECAY OF Po-208 AND Po-209 have been experimentally investigated by scientists of Mound Laboratory in order to derive a self-consistent decay scheme. The researchers, testing two source materials derived from irradiated bismuth, found new alpha groups having energies of 4.22 Mev with 2.44 X 0.0001% abundance in Po-208 decay and of 4.11 Mev, 4.31 Mev and 4.617 Mev with 5.66 x0.0001%, 1.46 x 0.0001%, and 0.48% abundance respectively in Po-209 decay. Conversion-electron studies of the 263 kev gamma-ray characterize it as an M1 + E2 transition. Electron-capture decay in Po-209 measured 0.263%; total electron-capture branching in Po-208 decay measured 0.00181%. A problem arising from the appearance of a gamma-ray triad of 534, 565 and 599 kev in the electron-capture decay of Po-208 was resolved by means of a gamma-ray conversion-electron coincidence technique using semiconductor detectors rather than sodium iodide crystals for electron measurements, a development the researchers feel could be a major technique for future use. . . . .ORDER MLM-1251 -- WEAK ALPHA AND ELECTRON-CAPTURE DECAY IN POLONIUM-208 AND POLONIUM-209. . . . .G. R. Hagee et al., Mound Lab., Mianisburg, Ohio, for the AEC, May 65 (recd Dec. 66), 58p.

A THERMAL-HYDRAULIC CODE designed for analysis of the hot channel in a fuel bundle has been adapted for use with an IBM 7090 at Oak Ridge National Laboratory. Originally written in FORTRAN and used in a design study for a heavy-water-moderated organic-cooled reactor, the code, converted to FORTRAN IV, has been designed to study the effect of design parameters on the thermal and hydraulic conditions for axial flow with intersubchannel mixing in fuel bundles. The program essentially examines the conditions in the hot subchannel and represents the remainder of the flow channel by its thermal and hydraulic equivalents. The study gives a step-by-step analysis of the program, including a sample run. . . . .ORDER ORNL-4015 -- ORNL VERSION OF THEME 1 CODE: A THERMAL-HYDRAULIC CODE FOR ANALYSIS OF THE HOT CHANNEL IN A FUEL BUNDLE. . . . .J. P. Sanders, Oak Ridge National Lab., Oak Ridge, Tenn., for the AEC, Nov. 66, 45p.

Atmospheric Sciences

A COMPLETE SOLAR IRRADIANCE CURVE FOR SEA LEVEL, covering the entire spectral range from 0.3 to 15.0 microns, has been constructed by scientists of the Navy's Marine Engineering Laboratory, using existing data from various sources. The scientists compiled the data, resolved differences, and corrected for revised values of the solar constant and atmosphere transmission factors. The compilation was developed incidentally to a broader study of the surface characteristics of materials and their interaction with electromagnetic radiation. In the opinion of the scientists, the compilation provides a readily usable basis for calculating solar heating effects on surfaces having different solar absorbing characteristics. . . . .ORDER AD-646 355 -- A COMPILATION OF SELECTED DATA ON SOLAR RADIATION AT SEA LEVEL. . . . .B. H. Morgan, Navy Marine Engineering Lab., Annapolis, Md., Feb. 67, 21p.

COMPUTER PROGRAMS FOR PREPARING SURFACE AND UPPER AIR MAPS and computing pattern characteristics have been designed by the Illinois State Water Survey of the University of Illinois in a continuing program of objective analysis of meteorological patterns. The study attempts to assess the statistical significance of certain meteorological parameters governing the production of precipitation in relation to all other significant predictors. The researchers have developed eight computer programs written in FORTRAN for surface and upper air analyses and computation of rainfall pattern characteristics, and are currently working on programs for computing vertical velocity and pattern cross-correlation involving time lags. They have used routine teletype meteorological data and reports by volunteer observers to analyze wind, pressure, temperature, and moisture fields, clouds, and synoptic features of circulation systems. These analyses are intended to serve as criteria for a choice of meaningful predictors. . . . .ORDER PB-173 973 -- RELATION OF LIGHTNING, RAINFALL, AND HAIL TO THE PROPERTIES OF MESOSCALE METEOROLOGICAL PATTERNS. . . . .P. J. Feteris and G. E. Stout, Univ. of Ill., Urbana, for the National Science Foundation, Nov. 66, 62p.

AN INVESTIGATION OF THE MOVEMENT AND PREDICTABILITY OF WEATHER RADAR ECHOES has been conducted by personnel of Travelers Research Center for ESSA. The investigation was for computer analysis of quantitative weather radar data collected by radars at Atlantic City, N. J., and Norman, Okla. The researchers used the location of the maximum cross-correlation coefficient between two echo patterns as an objective means for measuring the movement and predictability of the echo patterns. Considerable variability exists in the predictability of the echo patterns; however, over two-thirds of the variability can be explained by scale and intensity parameters of the patterns, according to the report. The researchers have developed an equation for converting the magnitude of the cross-correlation coefficient to percent "hits". The small-scale features (wavelengths less than 20 mi.) tend to move with the mean wind between 10,000 and 20,000 feet, resulting in little or no predictability for periods greater than 20 minutes. The larger-scale features move more slowly, resulting in high predictability for hours. . . . .ORDER PB-173 972 -- MOVEMENT AND PREDICTABILITY OF RADAR ECHOES. . . . .J. W. Wilson, Travelers Research Center, Hartford, Conn., for ESSA Institutes for Environmental Research (IERTM-NSSL-28), Nov. 66, 35p.

SHAPES AND STRESSES FOR ASCENDING BALLOONS have been calculated in a study by personnel of the National Center for Atmospheric Research. For purposes of calculation, the researchers assumed that the balloon material was symmetrically deployed about the vertical axis, and the balloons had zero pressure at the bottom apex when at design altitude. Starting with design data for four fully tailored and two cylinder natural-shape balloons with all the payload at the bottom apex (considered design extremes), the shape, stresses, zero-pressure level and top pressure were determined at ten altitudes below the design altitudes. Gore position and radius at the zero-pressure level were given as approximate values. Changes due to style of design were quite small so that a single curve would suffice for many purposes. . . . . ORDER PB-174 099 -- BALLOON SHAPES AND STRESSES BELOW THE DESIGN ALTITUDE. . . . . J. H. Smalley, National Center for Atmospheric Research (NCAR-TN-25), Boulder, Colo., Dec. 66, 27p.

Human Factors Engineering

THE USE OF ELECTROLUMINESCENT DISPLAYS IN AEROSPACE EQUIPMENT represents significant savings in weight, space, power consumption, and maintenance when compared with conventional displays, according to a study by scientists of Antioch College. However, the psychophysical and perceptual correlates of EL displays are not so well known as those of conventional displays. The report outlines the important psychological variables that need to be considered in the design of EL aerospace equipment displays, dividing perceptual tasks into five categories: detectability, discrimination, identification, recognition, and judgment. Displays are categorized as discrete or continuous, and as dynamic or static. For each display-task combination, the study proposes specific human factor research and details several specific experiments. The scientists feel that a major research effort in the area of EL pattern perception would yield results of interest to both the experimental psychologist and the design engineer. . . . .ORDER AD-646 459 -- HUMAN FACTORS IN THE DESIGN OF ELECTROLUMINESCENT DISPLAYS FOR AEROSPACE EQUIPMENT. . . . .H. H. Stenson, Antioch College, Yellow Springs, Ohio, for Aerospace Medical Research Labs. (AMRL-TR-66-130), Wright-Patterson AFB, Ohio, Sept. 66 (recd Feb. 67), 38p.

A GUIDE FOR THE PRACTICING DESIGNER OF AEROSPACE GOUND EQUIPMENT CONTROL PANELS has been developed by Bunker-Ramo Corporation as a supplement to current Air Force standards and specifications in the field. The report gives criteria and methods to use in designing control panels conforming to operator and system requirements to avoid hidden deficiencies only revealed under field testing. The system approach, encompassing a knowledge of all factors affecting the equipment and its operation, consists of an organization of equipment, personnel, and procedures directed toward the accomplishment of a specified goal or mission. Adequate design must satisfy requirements arising from the nature of the system. The study contains sample forms, or worksheets, to gather and present design information, steps to be followed in control panel design, and a listing of control/display technology presently available to designers. . . . .ORDER AD-646 443 -- DESIGNER'S GUIDE FOR EFFECTIVE DEVELOPMENT OF AEROSPACE GROUND EQUIPMENT CONTROL PANELS. . . . .D. Meister and D. E. Farr, Bunker-Ramo Corp., for Aerospace Medical Research Labs. (AMRL-TR-66-29), Wright-Patterson AFB, Ohio, Sept. 66 (recd Feb. 67), 130p.

Printing, Graphic Arts, Photography

PHOTOGRAPHIC EQUIPMENT FOR CONDUCTING COLOR DISCRIMINATION TESTS has been developed by researchers of the RAND Corporation in connection with a study dealing with human ability in missile defense discrimination. Motion picture color photography using subtractive color film seemed to be the most expedient method which satisfied the requirements of the tests. Equipment was developed to produce colored images on film by photographing a light source through several combinations of filters. A display simulator provided the multiple images required for the tests and permitted close control over image parameters, such as color and position. The researchers feel that significant results of the study include the fact that display simulation equipment can be built to incorporate the use of subtractive color films, and the physical specifications of the colors can be accurately controlled by using reputable subtractive color films subject to consistency of manufacturing and processing. . . . . ORDER AD-646 365 -- A DISPLAY SIMULATOR FOR COLORED-IMAGE PRESENTATION. . . . . R. H. Stratton, The RAND Corp. (RM-5015-ARPA), Santa Monica, Calif., for ARPA, Dec. 66, 91p.

Space Technology

A PROPOSAL FOR THE DESIGN, CONSTRUCTION, AND OPERATION OF A LARGE RADIO TELESCOPE SYSTEM for research in radio astronomy has been made by the National Radio Astronomy Observatory in a 2-volume analysis of the system. The proposed system, as outlined in Vol. I (announced in Research Highlights No. 6), would consist of a very large array of antennas and associated electronic equipment arranged in such a way as to yield, in 8 to 12 hours observing time, a radio "picture" of a region of sky with 1" angular resolution. The high resolution, sensitivity, and speed of the VLA would provide capabilities one to two orders of magnitude greater than those of any other existing or planned instrument. Volume II continues descriptions of individual components, their design, construction, assembly, factors influencing cost and performance, and estimated costs. An analysis of site development is included. . . . .ORDER PB-173 913 -- A PROPOSAL FOR A VERY LARGE ARRAY RADIO TELESCOPE, VOLUME II, SYSTEMS DESIGN. . . . . National Radio Astronomy Observatory, Green Bank, W. Va., for the National Science Foundation, Jan. 67, 272p. Vol. I is still available: ORDER PB-173 912 --Same Title, Vol. I, THE VLA CONCEPT, 170p.

Fluid- and Aerodynamics

A MOVING PRESSURE DISTRIBUTION ON A CALM-WATER SURFACE affects the pressure on the sea bottom to an extent depending on the shape and magnitude of the surface disturbance, its velocity, and the depth of the water. Scientists at the David Taylor Model Basin have formulated and solved the dynamic pressure problem within the framework of potential-flow, linear-wave theory. Results of a procedure of numerical analysis and computer programming are tabulated for one beam-to-length ratio, for various water depths, and for both subcritical and supercritical speeds. Knowledge of pressure variations is of marine interest in the study of pressure-activated mines. . . . .ORDER AD-646 428 -- THE PRESSURE ON THE SEA BOTTOM DUE TO A MOVING PRESSURE DISTRIBUTION. . . . . V. J. Monacella and J. N. Newman, David Taylor Model Basin (Report 2308), Washington, D.C., Jan. 67, 25p.

THE HYDROMAGNETIC FLOW OF A CONDUCTING, INCOMPRESSIBLE FLUID in the entrance section of a plane channel has been analyzed by scientists of Sandia Laboratory. The analysis includes a small cross-flow, constant wall injection or suction, Hall currents, and ion slip phenomena. The researchers selected an incompressible flow with variable conductivity to limit all induced effects to the viscous boundary layer so that Hall effects could be studied without mathematical complications. The model assumed a high temperature, highly conducting viscous boundary layer with a relatively cool inviscid core. The physical picture to which such a model can apply, aside from compressibility effects, is that of a hypersonic flow over slender bodies, where ionization is restricted primarily to the boundary layer. The solution was carried out with a generalized Karman-Pohlhausen momentum integral approach for both u- and v-momentum conservation equations which could be solved numerically. . . . .ORDER SC-RR-66-356 -- A GENERALIZED MAGNETOHYDRODYNAMIC ENTRANCE FLOW MODEL, 1. MOMENTUM INTEGRAL METHOD. . . . . W. S. Saric and K. J. Touryan, Sandia Corp., Albuquerque, N. M. for the AEC, Aug. 66 (recently recd), 52p.

THE EFFECT OF INLET VELOCITY ON THE PRESSURE RECOVERY EFFICIENCY of a subsonic conical diffuser with and without a ring-airfoil installed has been investigated by engineers of Clemson University. Testing of three diffusers and two ring-airfoils over a range of inlet Mach Number from 0.25 to 0.70 showed that the compressibility (Mach Number) effect is small compared to the Scaling (Reynolds-Number) effect, that there is an optimum Mach Number for each diffuser at which the pressure recovery efficiency is a maximum. Pressure recovery variation with respect to Mach Number ranged from 3 to 7 percent in the 0.25 to 0.70 range. . . . .ORDER AD-646 397 -- SPLITTER EFFECT IN CONICAL DIFFUSERS, PART III COMPRESSIBILITY EFFECT, PART IV PRESSURE DISTRIBUTION. . . . . T. Yang et al., Engineering Experiment Station, Clemson Univ. (Bulletin 108), for the U. S. Army, Clemson, S. C., 1966, 68p.

Mathematics

THE REGRESSION OF ONE OR MORE DEPENDENT VARIABLES (predictands) upon one or more independent variables (predictors), when the variables are assumed to be jointly normally distributed, is discussed in a study by mathematicians of Stanford University. Given a random sample of observations from the joint normal distribution of both sets of variables and an additional independent observation on the predictors, the problem is to predict the corresponding value of the predictands, when the loss function is the conditional mean square of the distance between the predicted and the actual values in the metric of the residual covariance matrix, given the sample of observations from the joint distribution. The mathematicians give some relations between this prediction problem and the problem of estimating the regression function and regression coefficients. . . . .ORDER AD-646 427 -- MULTIVARIATE MULTIPLE REGRESSION WITH STOCHASTIC PREDICTOR VARIABLES. . . . .S. L. Sclove, Stanford Univ. (Tech. Rpt 123), Stanford, Calif., Dec. 66, 32p.

Biological and Medical Sciences

AEROSOL SAMPLING AND SIZING TECHNIQUES from several laboratories have been compared and evaluated by the Lovelace Foundation in a preliminary step toward choosing a single, consistent method of particle size analysis. Electron microscopy studies have indicated a variation in count median diameter of plus or minus 10% and a variation in geometric standard deviation of plus or minus 15%. These variations have resulted in a spread of up to 6.8 times in the calculated mass median diameter. In comparing data from four laboratories, Lovelace scientists first used hand calculations, resulting in plus or minus 10% agreement in defining count median diameter and geometric standard deviation. The same data compared by computer programs reduced variations further so that calculated mass median diameters varied by a factor of 2 only. . . . .ORDER LF-30 -- EVALUATION OF PARTICLE SIZING TECHNIQUES; COMPARISON OF COMPUTER PARTICLE SIZING PROGRAMS. . . . .S. Posner et al., Lovelace Foundation, Albuquerque, N.M. for the AEC, July 66 (recently recd), 18p.

Management Control, Decision Systems

AN ANALYSIS OF A BROAD CLASS OF DYNAMIC PROGRAMMING PROBLEMS and a heuristic approach to a broader class of programs are contained in a study by the RAND Corporation. The analysis is concerned with elucidating the structure of the class of optimization problems to which the methods of dynamic programming are applicable. The common elements of these problems are collected under the name "sequential decision process." Since the analytic techniques used are fairly elementary, the study serves as an introduction to dynamic programming. It provides models with which an individual can determine the issue of whether the techniques of dynamic programming can be applied to his problem. Also included is an algorithm that can be used to analyze a broad array of sequential decision processes . . . . .ORDER AD-642 055 -- ELEMENTS OF SEQUENTIAL DECISION PROCESSES . . . . .E. V. Denardo and L. G. Mitten, The RAND Corp. (RM-5057-PR), Santa Monica, Calif., for the Air Force, Oct. 66 (recently recd), 40p.

Data Processing

A STUDY OF TECHNIQUES FOR IMPLEMENTATION OF PATTERN RECOGNITION by uniform isotropic boundary propagation has been conducted by Moleculon Corporation. The desired component was a flat screen capable of performing this process on arbitrary high-contrast input images, providing both the basic propagation process and also satisfying the condition that confluent boundaries annihilate without crossing. Techniques studied include electroluminescent/photoconductive laminates, glow discharge phenomena, diffusion processes, thin film reactions, image storage tube systems, and thin film magnetic phenomena. Research was on a theoretical level, including both analysis of basic propagation mechanisms and consideration of engineering parameters. The first three of the above systems appear potentially feasible, the EL/PC screen offering the most promise within the current state of the art. . . . . ORDER AD-646 361 -- MATERIALS STUDY FOR VISUAL TRANSFORMATION DEVICES. . . . . L. D. Nichols, Moleculon Research Corp., Cambridge, Mass., for the Air Force (AFCRL-66-689), July 66 (recd Feb. 67), 79p.

Electrical

TO IMPROVE A METHOD FOR FINDING THE MAGNETIC INDUCTION in the cross section of large electrical, heteropolar salient pole machines, scientists of the University of Colorado have developed a digital computer program using FORTRAN for pertinent mathematical calculations. In the original method, the solution was based on the non-linear quasi-Poissonian equation of the vector potential in the cross section of the electromechanical energy converter, taking into account the saturation of the material and the different current sources. The use of rectangular cartesian coordinates in practice meant that development of the machines' cross section along the airgap badly distorted the flux distribution in the armature core. The report establishes a corrective numerical method based on replacing the rectangular system of coordinates with circular polar coordinates, and applying the theory to a large d.c. machine. The computer program plots the machines' cross section from the magnetic vector potentials, and determines the value of the air gap flux by applying the mathematical technique of relaxation of the governing differential equations developed from electromagnetic field theory. . . . . ORDER AD-646 370 -- NON-LINEAR ANALYSIS OF HETEROPOLAR ELECTRO-MECHANICAL ENERGY CONVERTERS. . . . .E. A. Erdelyi, Dept. of Electrical Engineering, Univ. of Colo. for the Navy, Aug. 66 (recd Feb. 67), 88p.

Testing, Analysis

A TECHNIQUE FOR IDENTIFICATION AND CHARACTERIZATION OF FUELS AND LUBRICANTS with a minimum of time and requiring small sample size has been developed by the Army's Coating and Chemical Laboratory. The technique involves a gas-liquid chromatographic procedure for the preparation of standard fingerprint chromatograms of petroleum fuels and the utilization of the standard fingerprint chromatograms for identifying and characterizing unknown fuel samples. The technique allows rapid separation of fuel not only into specific hydrocarbon types (paraffins, naphthenes, olefins, etc.), but can reveal differences in motor gasolines such as grade type and blend changes, intercontamination of petroleum product types, and variations of certain types of turbine and diesel fuel. Unknown fuels can be identified and characterized by utilization of the standard chromatograms as reference guides. . . . .ORDER AD-646 382 -- IDENTIFICATION AND CHARACTERIZATION OF PETROLEUM FUELS USING TEMPERATURE-PROGRAMMED GAS-LIQUID CHROMATOGRAPHY. . . . .M. E. Le Pera, Army Coating and Chemical Lab., (CCL Report No. 218), Aberdeen Proving Ground, Md., Nov. 66 (recd Feb. 67), 45p.

Engineering and Construction

A PILOT MODEL OF HILO BAY was constructed and tested by the Army's Waterways Experiment Station to determine whether distortion of scales was appropriate for a tsunami model. Test results showed that a distortion factor of three had negligible effect on the amplification factor and location of bores within the bay. Tests also showed that a simple rise and fall of water surface at the bay mouth created a strong wave amplification within the bay if the period of oscillation was near that computed for resonant response of the bay. A wave generator can be positioned close to the bay mouth by using absorbers to reduce re-reflected waves. Feasibility of the model indicates that tests can be adequately conducted to add to current knowledge of tsunamis and bores and to determine a plan for amelioration of tsunami damage conditions at Hilo Harbor. . . . . ORDER AD-646 501 -- PILOT MODEL STUDY FOR THE DESIGN OF HILO HARBOR TSUNAMI MODEL. . . . . J. G. Housley, Army Engineer Waterways Experiment Station (Research Report No. 2-3), Vicksburg, Miss., Mar. 65 (recd Feb. 67), 86p.

RESEARCH & DEVELOPMENT REPORTS

1. AERONAUTICS

1A. AERODYNAMICS

A NEW TECHNIQUE FOR THE NUMERICAL ANALYSIS OF NONEQUILIBRIUM FLOWS.
Technical rept.,
General Applied Science Labs., Inc., Westbury, N. Y.
Luigi Moretti. 4 Mar 64, 48p TR-412
Contract AF 33 (657)-10463

Descriptors: (*Nonequilibrium flow, Numerical analysis), Hydrogen, Air, Two-dimensional flow, Differential equations, Reaction kinetics.

A new technique for the computation of inviscid flows with finite rate chemistry is presented. The case of hydrogen-air combustion is studied in full detail, but this technique can be applied to other mixtures. Difficulties due to instability in existing techniques are eliminated. Consequently, the step-size in the numerical finite difference procedure can be increased by 2 to 4 orders of magnitude. Lengthy calculations which make the programming of two-dimensional flows with finite rate chemistry uneconomical are reduced to a few seconds on a high-speed computer. A comparison of results of this technique with that of other techniques is presented. (Author)
AD-466 922 HC$3.00 MF$0.65

MAXIMUM LIFT-TO-DRAG RATIO OF A SLENDER, FLAT-TOP, HYPERSONIC BODY.
Rice Univ., Houston, Tex.
S. L. Brown, D. G. Hull, and A. Miele. 1967, 26p
NASA-CR-81157, AAR-30
Contract NGR-44-006-045

Descriptors: *Hypersonic speed, *Lift-drag ratio, *Slender body, Body, Contour, Drag, Elongation, Flat, Friction, Hypersonic, Lift, Longitudinal, Newton pressure law, Ratio, Skin, Slender, Speed, Thickness, Top, Transverse.

For abstract, see STAR 05 06.
N67-15384 HC$3.00 MF$0.65

INVESTIGATION OF THE FLOW PAST ELIPTICAL CONES.
Issledovaniye Obtekaniya Ellipticheskikh Konusov
National Aeronautics and Space Administration, Washington, D. C.
A. I. Shvets. Dec 66, 12p NASA-TT-F-10480
Transl. Into English From Izv. Akad. Nauk Sssr, Mekh. Zhidkosti I Gaza (Moscow), No. 1, 1966 P 130-137

Descriptors: *Elliptical cylinder, *Three-dimensional flow, Cone, Cross section, Cylinder, Dimensional, Distribution, Ellipticity, Flow, Mach number, Model, Pressure, Reynolds number, Shock, Surface, Three, Wave, Wind tunnel.

For abstract, see STAR 05 06.
N67-15559 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATION OF SECONDARY JETS FROM TWO-DIMENSIONAL NOZZLES WITH VARIOUS EXIT MACH NUMBERS FOR HYPERSONIC CONTROL APPLICATION.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
D. W. Alston, J. B. Barber, D. J. Romeo, and J. R. Sterrett. Jan 67, 48p NASA-TN-D-3795
Contract 129-01-09-15-23

Descriptors: *Aerodynamics, *Exhaust nozzle, *Hypersonic vehicle, *Two-dimensional jet, Characteristics, Control, Dimensional, Distribution, Exhaust, Flat, Flow, Front, Hypersonic, Jet, Model, Nozzle, Penetration, Plate, Pressure, Separation, Shock, Sonic, Supersonic, Surface, Test, Thrust, Tunnel, Two, Vector, Vehicle, Wind.

For abstract, see STAR 05 06.
N67-15664 HC$3.00 MF$0.65

NUMERICAL SOLUTION OF THE PROBLEM OF SUPERSONIC FLOW AT AN ANGLE OF ATTACK PAST CONICAL BODIES.
K Chislennomu Resheniyu Zadachi O Sverkhzvukovom Obtekanii Konicheskikh Tel Pod Uglom Ataki
National Aeronautics and Space Administration, Washington, D. C.
N. A. Makhin, and V. F. Syagayev. Dec 66, 6p
NASA-TT-F-10481
Transl. Into English From Izv. Akad. Nauk Sssr, Mekhan. Zhidkosti I Gaza (Ussr), No. 1, 1966 P 140-142

Descriptors: *Angle of attack, *Conical flow, *Numerical analysis, *Supersonic flow, Analysis, Arbitrary, Body, Calculation, Conical, Critical, Density, Ellipsoid, Flow, Numerical, Point, Pressure, Smoothness, Solution, Supersonic.

For abstract, see STAR 05 06.
N67-15693 HC$3.00 MF$0.65

SHAPES FORMED BY STREAM SURFACES OF CONICAL FLOWS.
Tela, Obrazovannyye Poverkhnostyami Toka Konicheskikh Techeniy
National Aeronautics and Space Administration, Washington, D. C.
G. I. Maykapar. Dec 66, 5p NASA-TT-F-10484
Transl. Into English From Izv. Akad. Nauk Sssr, Mekhan. Zhidkosti I Gaza (Ussr), No. 1, 1966 P 126-127

Descriptors: *Aerodynamic force, *Conical flow, *Supersonic flow, Aerodynamic, Body, Characteristics, Conical, Cross section, Flow, Force, Intersection, Line, Nose, Shape, Shock, Stream, Supersonic, Surface.

For abstract, see STAR 05 06.
N67-15694 HC$3.00 MF$0.65

HYPERSONIC PROFILE OF MINIMUM DRAG, HAVING AN ASSIGNED BENDING STRENGTH.
Giperzvukovoy Profil', Imeyushchiy Zadannuyu Prochnost Na Izgib I Minimal'noye Soprotivleniye
National Aeronautics and Space Administration, Washington, D. C.
YE. V. Bulygina, and YU. N. Yudintsev. Jan 67, 9p NASA-TT-F-10639
Transl. Into English From Izv. Vyssh. Ucheb. Zaved., Ser. Aviats. Tekh. (Kazan), No. 2, 1966 P 119-125

Descriptors: *Bending moment, *Hypersonic flow, *Minimum drag, *Variational calculus, Aerodynamics, Bending, Calculus, Drag, Equation, Flow, Hypersonic, Method, Minimum, Moment, Pressure, Profile, Strength, Torque, Variation.

For abstract, see STAR 05 06.
N67-15699 HC$3.00 MF$0.65

AERODYNAMIC CHARACTERISTICS OF RECTANGULAR PLATES IN HYPERSONIC FLOW OF A RAREFIED GAS.
Aerodinamicheskiye Kharakteristiki Pryamougol'nykh Plastin V Giperzvukovom Potoke Razrezhennogo Gaza
National Aeronautics and Space Administration, Washington, D. C.
M. D. Ladyzhenskiy, and A. V. Lipin. Dec 66, 6p NASA-TT-F-10483
Transl. Into English From Izv. Akad. Nauk Sssr, Mekhan. Zhidkosti I Gaza (Ussr), No. 1, 1966 P 142-144

Descriptors: *Hypersonic flow, *Rarefied gas, *Rectangular plate, Aerodynamic, Aspect, Characteristics, Ratio, Shape, Thickness, Viscous, Wing.

For abstract, see STAR 05 06.
N67-15832 HC$3.00 MF$0.65

SOME EXACT SOLUTIONS OF THE PROBLEM OF THE HYPERSONIC OR SUPERSONIC FLOW OF A GAS PAST A SLIPPING WING WITH STALL FENCE.
Nekotoryye Tochnyye Resheniya Zadachi Obteka- Niya Skol'zyashchego Kryla S Peregorodkoy Sverkhzvukovym I Giperzvukovym Potokom Gaza
National Aeronautics and Space Administration, Washington, D. C.
A. I. Golubinskiy, and A. N. Ivanov. Dec 66, 10p
NASA-TT-F-10485
Transl. Into English From Izv. Akad. Nauk Sssr, Mekh. Zhidkosti I Gaza (Moscow), No. 1, Jan. - Feb. 1966 P 145-149

Descriptors: *Delta wing, *Gas flow, *Hypersonic flow, *Supersonic flow, *Wing stall, Analysis, Configuration, Delta, Dimensional, Fence, Flow, Gas, Hypersonic, Pressure, Slip, Solution, Stall, Supersonic, Three, U.S.S.R., Wing.

For abstract, see STAR 05 06.
N67-15842 HC$3.00 MF$0.65

EFFECTS OF CONFIGURATION GEOMETRY ON THE SUPERSONIC AERODYNAMIC CHARACTERISTICS OF A SIMULATED LAUNCH VEHICLE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
J. A. Blackwell, Jr., and R. D. Samuels. Jan 67, 35p NASA-TN-D-3755
Contract 124-10-01-01-23

Descriptors: *Aerodynamic characteristics, *Launch vehicle configuration, *Supersonic wind tunnel, Aerodynamics, Angle, Characteristics, Cone, Configuration, Effect, Fine, Flare, Launch, Nose, Ratio, Simulation, Stage, Supersonic, Test, Transition, Tunnel, Upper, Vehicle, Wind.

For abstract, see STAR 05 06.
N67-15957 HC$3.00 MF$0.65

HOVERING PERFORMANCE CHARACTERISTICS OF A ROTOR WITH AND WITHOUT BLADE-PITCH SERVO-CONTROL FLAPS.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
J. P. Shivers. Jan 67, 17p NASA-TN-D-3786
Contract 721-01-00-02-23

Descriptors: *Helicopter rotor, *Hovering stability, *Performance characteristics, Aerodynamics, Blade, Characteristics, Disk, Evaluation, Flap, Helicopter, Hovering, Performance, Photography, Pitch, Rotor, Servocontrol, Stability, Thrust, Torque.

For abstract, see STAR 05 06.
N67-15958 HC$3.00 MF$0.65

ON CERTAIN TYPES OF SELF-EXCITED OSCILLATION OCCURRING WITH AIRCRAFT CONTROL SURFACES IN TRANSONIC FLOW.
National Physical Lab., Teddington (England). Aerodynamics Div.
For primary bibliographic entry see Field 1D.
For abstract, see STAR 05 06.
N67-16194 HC$3.00 MF$0.65

1B. AERONAUTICS

WEATHER FACTORS AFFECTING AERIAL PHOTOGRAPHY AND OPERATIONS IN TANGANYIKA, UGANDA AND KENYA.
Weather Wing (7th), Scott AFB, Ill.
For primary bibliographic entry see Field 4B.
AD-646 356 HC$3.00 MF$0.65

WEATHER FACTORS AFFECTING AERIAL PHOTOGRAPHY AND OPERATIONS IN FRENCH SOMALILAND AND SOMALI REPUBLIC.
Weather Wing (7th), Scott AFB, Ill.
For primary bibliographic entry see Field 4B.
AD-646 357 HC$3.00 MF$0.65

EARTH COVER AND CONTOUR EFFECTS ON IMAGE GLIDE PATHS, PHASE II.
Ohio Univ., Athens. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 17G.
AD-646 561 HC$3.00 MF$0.65

APPROACH TO THE EVALUATION OF TOXIC HAZARDS FROM WEAPONS EXHAUST IN ARMED HELICOPTERS,
Army Aeromedical Research Unit, Fort Rucker, Ala.
For primary bibliographic entry see Field 6U.
AD-646 587 HC$3.00 MF$0.65

THE SONIC BOOM PROBLEM.
Deputy Chief of Staff, Research and Development (Air Force), Washington, D. C.
For primary bibliographic entry see Field 1C.
AD-646 676 HC$3.00 MF$0.65

A STUDY OF MILITARY IMPLICATIONS OF PROTECTIVE DEVICES DESIGNED TO PREVENT OR AMELIORATE HEAD AND NECK INJURIES.
Federation of American Societies for Experimental Biology, Washington, D. C. Life Sciences Research Office.
For primary bibliographic entry see Field 6E.
AD-646 841 HC$3.00 MF$0.65

TURBULENCE IN CLEAR AIR NEAR THUNDERSTORMS.
Royal Aircraft Establishment, Farnborough (England).
For primary bibliographic entry see Field 4A.
PB-173 992 HC$3.00 MF$0.65

1C. AIRCRAFT

THE BASE MAINTENANCE-OPERATIONS MODEL USED IN RAND LOGISTICS RESEARCH.
RAND Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 15E.
AD-220 605 HC$3.00

THE DRAG OF A LARGE AND SMALL PNEUMATIC TYRE TRAVELLING THROUGH WATER, SLUSH AND SNOW,
Ministry of Aviation, London (England). Technical Information and Library Services.
R. W. Sugg. Oct 66, 33p
MA-S/T Memo-9/66

Descriptors: (*Tires, Drag), Water, Snow, Aircraft tires, Great Britain, Experimental data.

Tests were made with a 35 x 10-17 aircraft tyre using the heavy load test vehicle described in S and T Memo 8/63 and results were compared with those from a 13 in. diameter, 3 in. wide tyre in trials of a recently developed device, a slush drag meter, to measure the water equivalent depth of runway contamination. Trials were conducted at Bromma, Sweden, on natural snow and at Road Research Laboratory at Crowthorne and Bristol University on water and ground ice with the small tyre and slush drag meter, and at Crowthorne only with the aircraft tyre. Within the speed range of the tests (up to 90 ft/sec) it was found that drag varied linearly with velocity squared in water and ground ice with both tyres and with the small tyre in Swedish snow. With the small tyre drag per inch increased with depth but was constant with the large tyre. (Author)
AD-646 464 HC$3.00 MF$0.65

INVESTIGATION OF DEPLOYMENT AND LANDING LOADS WITH A LIMP PARAGLIDER.
Final rept.,
Army Aviation Materiel Labs., Fort Eustis, Va.
John W. Sobczak. Sep 66, 51p USAAVLABS-TR-66-82

Descriptors: (*Parachutes, *Gliders), Landing impact, Wings, Loading (Mechanics), Parachute jumping, Drop testing.
Identifiers: Paragliders.

The report covers the initial evaluation of the National Aeronautics and Space Administration's (NASA) 24-foot limp parawing for use as a manned aerial delivery system. A satisfactory application of the parawing to this use will provide the capability of offset precision aerial delivery of personnel. Aided by a navigational system, the parawing could be employed during night and during conditions of adverse visibility. The primary objective of the evaluation was the acquisition of deployment load data on the parawing. Testing, which included dummy drop tests and live drop tests, was conducted from 16 March 1966 to 20 April 1966. In general, the measured and observed characteristics of the parawing, coupled with the comments of the members of the U. S. Army Parachute Team (USAPT) who flew the wing, indicate that the parawing has potential and merits further investigation. Specifically, the loads were found to be within human tolerance and were no greater than those experienced in jumping conventional parachutes. The glide ratio of the parawing appears to be in excess of 2:1. (Author)
AD-646 578 HC$3.00 MF$0.65

A METHOD FOR PREDICTING PERFORMANCE OF OPEN SEAT EGRESS SYSTEMS,
Naval Ordnance Test Ordnance Test Station, China Lake, Calif.
W. J. Stone, and W. B. Stelwagon. Nov 66, 68p
NOTS-TP-3551
NAVWEPS-8542

Descriptors: (*Computer programs, Control sequences), (*Ejection seats, Performance (Engineering)), Simulation, Tests, Aircraft equipment.
Identifiers: EMEREG.

Description and principles of operation of a computer program called EMEREG are discussed. Samples of program output are included and compared to data from actual tests. Instructions for using the program are included. (Author)
AD-646 650 HC$3.00 MF$0.65

HYPERSONIC FLOW OF BLUNT DELTA WINGS AT LOW ANGLES OF ATTACK. I. SHOCK WAVE SHAPE AND SURFACE PRESSURE DISTRIBUTION.
ARA, Inc., West Covina, Calif.
For primary bibliographic entry see Field 20D.
AD-646 665 HC$3.00 MF$0.65

THE SONIC BOOM PROBLEM.
Development Planning memo.
Deputy Chief of Staff, Research and Development (Air Force), Washington, D. C.
Mar 63, 32p

Descriptors: (*Sonic boom, State-of-the-art reviews), (*Supersonic planes, Design), (*Transport planes, Design), (*Civil aviation, Sonic boom), Flight testing, Lift, Public opinion, Propagation, Supersonic flight.

The memo summarizes the current state of knowledge relating to sonic boom generation, propagation, and effects, and attempts to judge the severity of the problem that will arise with the beginning of commercial supersonic flights. It is based on both recently published information and conversations with specialists throughout the country who are working in the sonic boom field. The latter include representatives of private industry as well as of Government agencies. (Author)
AD-646 676 HC$3.00 MF$0.65

RANDOM VARIATIONS AND SAMPLING MODELS IN PRODUCTION ECONOMICS,
RAND Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 5C.
AD-646 720 HC$3.00 MF$0.65

EFFECT OF GROUND BOARD BOUNDARY LAYER ON AIR CUSHION VEHICLE WIND TUNNEL TESTS.
Technical note,
Toronto Univ. (Ontario). Inst. for Aerospace Studies.
E. K. Garay. Jan 67, 50p UTIAS-TN-100
Contract AF 33 (657)-8451

Descriptors: (*Ground effect machines, *Boundary layer), Model tests, Wind tunnel models, Leading edge, Test methods, Aircraft engines, Airplane models, Aerodynamic characteristics, Lift, Drag, Canada.

Forward speed tests were performed on an Air Cushion Vehicle in the subsonic wind tunnel using a fixed ground board. The effect of the ground board boundary layer on the reactions of the vehicle was determined by comparing the test results with previous tethered flight tests conducted in the circular track facility. Comparisons with similar reported tests were made to extend these test results. The results did not indicate any noticeable differences between the wind tunnel and circular track results. Analysis showed that differences begin to appear as the forward speed increases and curves the leading edge jet backwards. The magnitude of the boundary layer effect on the vehicle reactions is shown to depend on the testing technique used. The suitability of low priced model aircraft engines for low budget powered model testing is demonstrated. (Author)
AD-646 808 HC$3.00 MF$0.65

EFFECT OF LANDING-LIGHT BACKSCATTER ON TARGET VISIBILITY IN FOG.
Final rept.,
California Univ., Berkeley. Inst. of Transportation and Traffic Engineering.
D. M. Finch, E. C. Curwen, and L. E. King. Sep 66, 36p
FAA-RD-66-60
Contract FAA/ARDS-434

Descriptors: (*Landing lights, Backscattering), (*Fog, Landing lights), Vision, All-weather aviation, Controlled atmospheres, Visibility, Runways, Marker lights, Brightness, Lighting equipment.

Tests were conducted in the FAA Fog Chamber to determine if backscatter from aircraft landing lights in visual ranges of 3 mi, 2600 ft, and 1200 ft would interfere with an observer's ability to see a set of amber target lights at the runway thres-

hold. Results from a total of 518 test observations, made by 14 observers, indicate substantially no reduction in target-light visibility in visual ranges of 3 mi and 2600 ft. In the 1200-ft visual range, the visibility of the target lights was reduced by an appreciable amount.
AD-646 843 HC$3.00 MF$0.65

RADAR BEACON SYSTEM AND ANTENNA EVALUATION PROGRAM FOR SD-1 DRONES. VOLUME I,
Radioplane Co., Van Nuys, Calif.
For primary bibliographic entry see Field 17I.
AD-646 905 HC$3.00 MF$0.65

RADAR BEACON SYSTEM AND ANTENNA EVALUATION PROGRAM FOR SD-1 DRONES. APPENDIX. VOLUME II,
Radioplane Co., Van Nuys, Calif.
For primary bibliographic entry see Field 17I.
AD-646 906 HC$3.00 MF$0.65

ELEMENTS AND DRIVES OF POWER FOLLOW-UP SYSTEMS: COLLECTION OF ARTICLES.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 13I.
AD-646 932 HC$3.00 MF$0.65

WIND-TUNNEL INVESTIGATION OF THE FLIGHT CHARACTERISTICS OF A MODEL OF AN ASPECT- RATIO-6 CONICAL-PARAWING UTILITY VEHICLE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
C. C. Smith, Jr., and G. M. Ware. Feb 67, 42p
NASA-TN-D-3673
Contract 126-13-01-19-23

Descriptors: *Flight characteristics, *Parawing, *Utility aircraft, *Wind tunnel, Aircraft, Aspect, Cargo, Characteristics, Conical, Drag, Flight, Lift, Platform, Ratio, Stability, Tunnel, Utility, Wind.

For abstract, see STAR 05 06.
N67-16684 HC$3.00 MF$0.65

1D. AIRCRAFT FLIGHT CONTROL AND INSTRUMENTATION

THE ALGORITHMIZATION OF THE PROCESSES OF CONTROL OF THE AERIAL MOTION OF AIRCRAFT,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
V. M. Leshchenko. 28 Sep 66, 15p FTD-HT-66-545
TT-67-60766
Unedited rough draft trans. of mono. Avtomaticheskoe Operativnoe Upravlenie Proizvodstvennymi Protsessami, Moscow, 1965 p204-10.

Descriptors: (*Flight control systems, Automation), Aerodynamic characteristics, Aircraft, Control, Algorithms, USSR.

An analysis of the dynamic properties of aircraft as controlled objects conducted on the basis of the results of theoretical and experimental investigations shows that in the algorithmization of the air navigation problems one should examine only the motion of the centers of mass of the aircraft.
AD-646 367 HC$3.00 MF$0.65

ON CERTAIN TYPES OF SELF-EXCITED OSCILLATION OCCURRING WITH AIRCRAFT CONTROL SURFACES IN TRANSONIC FLOW.
National Physical Lab., Teddington (England). Aerodynamics Div.
N. C. Lambourne. 21 Feb 66, 15p NPL-AERO-1191, ARC-27852
Presented At The Colloq. On Mech. Vibration And Shock, London, 30 Mar. 1966

Descriptors: *Aircraft control, *Control surface, *Self-oscillation, *Transonic flow, Aerodynamic, Aircraft, Control, Flow, Shock, Stability, Surface, Transonic, Tunnel, Wave, Wind.

For abstract, see STAR 05 06.
N67-16194 HC$3.00 MF$0.65

1E. AIR FACILITIES

EFFECT OF LANDING-LIGHT BACKSCATTER ON TARGET VISIBILITY IN FOG.
California Univ., Berkeley. Inst. of Transportation and Traffic Engineering.
For primary bibliographic entry see Field 1C.
AD-646 843 HC$3.00 MF$0.65

2. AGRICULTURE

2A. AGRICULTURAL CHEMISTRY

CBE FACTORS: MONTHLY SURVEY NO. 12.
Aerospace Technology Div., Library of Congress, Washington, D. C.
For primary bibliographic entry see Field 15B.
AD-646 899 HC$3.00 MF$0.65

2B. AGRICULTURAL ECONOMICS

THE FEASIBILITY OF COOPERATIVE CATTLE FEEDING IN MONTANA. OPPORTUNITY FOR EXPANDED CATTLE FEEDING IN MONTANA,
Montana Agricultural Experiment Station, Bozeman. Dept. of Agricultural Economics and Rural Sociology.
Elroy C. McDermott, and Jack R. Davidson. Jul 65, 82p Bull-597

Descriptors: (*Economics, Bovines), (*Bovines, Ingestion (Physiology)), Montana, Management planning, Feasibility studies, Rural areas, Budgets, Cereals.

Contents: Opportunity for expanded cattle feeding in Montana: Resources and opportunities for expanded feeding in northeastern Montana: Opportunities for cooperative feeding in northeastern Montana: The feasibility of additional slaughtering in the northeast area: Coordinated cooperative livestock feeding and slaughtering. (Author)
PB-174 079 HC$3.00 MF$0.65

2E. ANIMAL HUSBANDRY

LATENT VIRAL DISEASES IN THE DOG,
Armed Forces Inst. of Pathology, Washington, D. C. Geographic Pathology Div.
Erby L. Massie. 1966, 4p
Availability: Published in Animal Hospital v2 p215-8 1966.

Descriptors: (*Respiratory diseases, *Dogs), (*Virus diseases, Dogs), Veterinary medicine, Etiology, Immunity, Serodiagnosis, Antigens + antibodies, Enteroviruses.
Identifiers: Reoviruses, Hemagglutination-inhibition tests.

Respiratory disease is one of the most common causes of illness in the domestic dog. Veterinary clinicians have recognized canine distemper for many years, but minor respiratory complications have not received much attention until recently. Today pet owners and research workers demand a healthy animal. It is this need for soundness that has prompted us to study the so-called latent respiratory diseases of the dog. Many of the techniques used to study upper respiratory disease in man have been adapted to a study of similar diseases in the dog and have produced analogous findings. The most rewarding subject of these studies has been the reovirus group, particularly reovirus type one, in which a rise in the hemagglutination-inhibition antibody titers has been observed in animals suffering from respiratory disease. Reovirus type one was isolated from a sick dog and injected into weanling pups with the subsequent appearance of rhinitis, anorexia, and a rise in temperature. Recovery of the pups was uncomplicated and complete. A significant increase in antibodies was demonstrated in the dogs which received the injections. Several other viral agents of the enterovirus group have also been isolated but have not as yet been classified or clinically studied. At present, efforts are being made to differentiate between latent viruses of upper respiratory disease and the more serious virus of canine distemper. Immunofluorescence is being employed in the examination of nasal and conjunctival smears from sick animals. Serum-neutralization tests are also being conducted by using a mouse-adapted strain of canine distemper virus. (Author)
AD-646 684 Not available from CFSTI.

THE FEASIBILITY OF COOPERATIVE CATTLE FEEDING IN MONTANA. OPPORTUNITY FOR EXPANDED CATTLE FEEDING IN MONTANA,
Montana Agricultural Experiment Station, Bozeman. Dept. of Agricultural Economics and Rural Sociology.
For primary bibliographic entry see Field 2B.
PB-174 079 HC$3.00 MF$0.65

2F. FORESTRY

PHYSICAL AND MECHANICAL PROPERTIES OF 'NORFOLK-ISLAND PINE' GROWN IN HAWAII.
Research paper,
Forest Products Lab., Madison, Wis.
C. C. Gerhards. Jan 67, 12p FPL-73

Descriptors: (*Trees, Mechanical properties), Physical properties, Hawaii, Shrinkage, Moisture, Compressive properties, Density, Forestry, Wood.

The physical and mechanical properties of the wood species 'Norfolk-Island-pine' grown in Hawaii are presented. Evaluations of those properties show that the wood is moderately heavy, moderately strong in both bending and compressive strength, stiff, and moderately hard; its shrinkage is small. (Author)
AD-646 563 HC$3.00 MF$0.65

COMPARATIVE DECAY RESISTANCE OF HEARTWOOD OF NATIVE SPECIES.
Research note.
Forest Products Lab., Madison, Wis.
Jan 67, 2p FPL-0153
Revised from U. S. Forest Products Laboratory rept. no. 68.

Descriptors: (*Fungus deterioration, Resistance (Biological)), (*Wood, Fungus deterioration), Trees, Degradation, Preservation.

The report gives the general resistance to decay of a number of native wood species grown in the United States, and some factors affecting decay resistance. (Author)
AD-646 567 HC$3.00 MF$0.65

FACTORS INFLUENCING DECAY OF UNTREATED WOOD.
Research note.
Forest Products Lab., Madison, Wis.
Jan 67, 3p FPL-0154

Descriptors: (*Wood, Fungus deterioration), Degradation, Moisture, Air, Temperature, Trees, Drying, Buildings, Control.

The various conditions that have been shown by study and experience to influence the decay of wood are discussed. These particularly touch on the fungi's need for moisture, air, and suitable temperatures, and how control measures usually hinge on restricting at least one of these. (Author)
AD-646 568 HC$3.00 MF$0.65

TIMBER RESOURCE DEVELOPMENT ON THE NORTHERN CHEYENNE INDIAN RESERVATION, A FEASIBILITY STUDY.
Northwest Economics, Inc., Bellevue, Wash.
Apr 66, 63p
Contract C-273-65
Prepared in cooperation with Economic Development Administration, Dept. of Commerce, Washington, D. C.

Descriptors: (*Trees, Natural resources), (*Forestry, Research program administration), Wood, Budget, Economics, Plywood, Laminates, Labor.

Opportunities for developing timber resources on the Northern Cheyenne Indian Reservation by establishing wood-conversion facilities are limited. Substantial quantities of timber are available. This timber is low quality and converting it would, at best, involve low expected profits and high risks. Specific evaluations were made of the economic feasibility of producing lumber, chips, treated and untreated posts and poles, particle board, and miscellaneous specialty products. Neither the chipper nor the particle board plant appear to be economically feasible at the present time. A sawmill would be marginal. A pressure treating plant for producing fence posts was determined to be feasible. It should be emphasized that the plant would have to be operated near full capacity in order to sustain a profitable operation. Continuous effort would therefore be required to ensure that local markets be maintained against inroads that are currently being made into the area by producers of steel fence posts. (Author)
PB-174 057 HC$3.00 MF$0.65

3. ASTRONOMY AND ASTROPHYSICS

3A. ASTRONOMY

EXPOSURE PREDICTIONS FOR GEODETIC SATELLITE PHOTOGRAPHY BY STELLAR PHOTOMETRY,
EG and G, Inc., Bedford, Mass.
For primary bibliographic entry see Field 22D.
AD-646 878 HC$3.00 MF$0.65

COMMUNICATIONS OF THE LUNAR AND PLANETARY LABORATORY, NOS. 58-59.
Arizona Univ., Tucson.
1966, 80p NASA-CR-81160
Grant NSG-161
Its Vol. 4, Pt. 1

Descriptors: *Color photography, *Lunar mare, *Photograph interpretation, *Ranger vii lunar probe, Color, Cosmic, Crater, Dust, High resolution, Impact, Interpretation, Lunar, Mare, Photograph, Photography, Structure.

For abstract, see STAR 05 06.
N67-15400 HC$3.00 MF$0.65

OPTICAL INSTABILITY OF THE EARTH'S ATMOSPHERE.
Israel Program for Scientific Translations, Ltd., Jerusalem.
For primary bibliographic entry see Field 4B.
For abstract, see STAR 05 06.
N67-15461 HC$3.00 MF$0.65

3B. ASTROPHYSICS

A COMPILATION OF SELECTED DATA ON SOLAR RADIATION AT SEA LEVEL.
Navy Marine Engineering Lab., Annapolis, Md.
For primary bibliographic entry see Field 4A.
AD-646 355 HC$3.00 MF$0.65

BASIC SOLAR RESEARCH.
Annual rept., 1 Oct 65-1 Oct 66,
Michigan Univ., Ann Arbor. Dept. of Astronomy.
O. C. Mohler. 1 Oct 66, 7p
Contract Nonr-1224 (19)

Descriptors: (*Astronomical observatories, Scientific research), Solar flares, Sun, Solar spectrum, Instrumentation, Solar atmosphere, Solar disturbances, Computer programs, Sunspots, Atmosphere models, Electron density, Chromosphere, Magnetic fields.

The staff of the McMath-Hulbert Observatory engaged in a number of studies concerned with solar activity, solar flares, solar-terrestrial relationships, solar spectroscopy, and applications of hydromagnetic theory to the sun.
D-646 372 HC$3.00 MF$0.65

THE SUN AS A VARIABLE STAR III.
Final rept. for 1950-1966,
Lowell Observatory, Flagstaff, Ariz.
M. Jerzykiewicz, and K. Serkowski. Jan 67, 32p
Bull-137
AFCRL-66-792
Contract AF 19 (628)-3809

Descriptors: (*Sun, *Variable stars), (*Uranus (Planet), Brightness), (*Neptune (Planet), Brightness), Photometers, Spectra (Visible + ultraviolet), Diurnal variations, Astrophysics, Colors.

The observations of Neptune in the years 1950-1962, corrected for the effects of changing distance, indicate a decrease in blue magnitude from 8.26 to 8.23. During the period 1963-1966 the brightness was constant and equal to 8.24 mag. The steady decrease of the instrumental transformation coefficient A8 in the years 1950-1960 throws some doubt on the reality of the changes in Neptune's brightness. If these changes are real they may be due either to intrinsic changes in Neptune's surface or to solar variability or to both. The observations of Uranus indicate no changes in solar brightness from 1950 to 1966 if 22 percent darkening from the equator towards the pole of the planet is assumed. On this assumption the total range of the intrinsic change of the blue magnitude of Uranus is 0.038 mag., with a period of 42 years. In the authors opinion, this long sequence of photoelectric observations has taught us more about the variations of solar type stars than about the sun itself. The observations of 15 stars of spectral types F and G in the years 1955-1966 indicate that for none of these stars does the standard deviation of the yearly mean magnitude exceed 0.008, and for the stars 40 Leo, beta CVn and eta Boo this deviation is less than 0.004 mag. No evidence of variability in the stars which are similar to the sun has been detected during this program. If we assume the sun acts in similar fashion to each of these stars, its variability over a fifteen-year period probably does not exceed one-half of one percent. Another by-product of this research results from one of the most extensive series of night-time extinction observations ever carried out at a single observatory. (Author)
AD-646 446 HC$3.00 MF$0.65

NOTE ON THE EFFECT OF SHADOWING ON A RANDOM ROUGH SURFACE,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
For primary bibliographic entry see Field 20N.
AD-646 482 Not available from CFSTI.

RADAR VERIFICATION OF THE DOPPLER FORMULA,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
For primary bibliographic entry see Field 20N.
AD-646 487 Not available from CFSTI.

PROGRAM 631A. VOLUME VI. EXPERIMENT D 8: RADIATION IN SPACECRAFT.
Air Force Weapons Lab., Kirtland AFB, N. Mex.
For primary bibliographic entry see Field 22A.
AD-646 555 HC$3.00 MF$0.65

A NOTE ON THE GALACTIC RADIATION EXPOSURE IN GEOMAGNETICALLY UNPROTECTED REGIONS OF SPACE.
Naval Aerospace Medical Inst., Pensacola, Fla.
For primary bibliographic entry see Field 6R.
AD-646 583 HC$3.00 MF$0.65

FOREIGN SCIENCE BULLETIN VOL. 3, NO. 1, 1967.
Library of Congress, Washington, D. C. Aerospace Technology Div.
For primary bibliographic entry see Field 5A.
AD-646 634 HC$3.00 MF$0.65

ON THE ALPHA WIDTH OF THE 7.12-MEV STATE OF OXYGEN AND THE PRODUCTS OF HELIUM BURNING,
California Inst. of Tech., Pasadena.
G. J. Stephenson, Jr. 26 Sep 66, 4p
Contract Nonr-220 (47)
Availability: Published in Astrophysical Journal v146 n3 p950-3 Dec 1966.

Descriptors: (*Stars, Thermonuclear reactions), (*Helium, Stars), Nuclear reactions, Carbon, Oxygen, Nuclear energy levels, Alpha particle reactions, Gamma emission, Mathematical models, Groups (Mathematics), Matrix algebra, Wave functions.

It has been recognized for some time that the end product of helium burning in stars will be either C12 or O16 depending upon the reduced alpha-particle width of the fourth excited state of O16, a 1 (-) state at an excitation energy of 7.12 MeV. Inasmuch as this state lies 40 keV below the threshold for C12 (alpha, gamma)O16 reactions, it has not been possible to make a direct measurement of the width. Previous theoretical estimates have all been hampered by the inability of the models used to predict the requisite number of low-lying states. Brown and Green recently discussed a model of O16 which is free of this difficulty. To define further the model by allowing for mixing between the bands projected from the different intrinsic states, these deformed states are identified with the SU (3) states of maximum weight. In this notation the one-particle-one-hole state is identified with the (2,1) set representation and the three-particle-three-hole state is identified with the (6,3) set representation.
AD-646 784 Not available from CFSTI.

A MECHANISM FOR MASS EJECTION IN RED GIANTS,
California Inst. of Tech., Pasadena.
N. C. Wickramasinghe, B. D. Donn, and T. P. Stecher. 25 Apr 66, 5p
Contract Nonr-220 (47), Grant NSF-GP-5391
Prepared in cooperation with Jesus Coll., Cambridge (England), and NASA.
Availability: Published in The Astrophysical Journal v146 n2 p590-3 Nov 1966.

Descriptors: (*Stars, Ejection), Interstellar matter, Sources, Particles, Graphite, Condensation, Gas flow, Electromagnetic waves, Nucleation, Great Britain.

In a recent paper Weymann (Ap-J-v136 p476 1962) has discussed various mechanisms which have been proposed for the ejection of matter from red giants such as alpha Orionis. The main difficulty is to explain the observed apparently constant outflow of matter beyond 10 stellar radii with a speed of about 10km/sec which is less than the escape velocity from the star. Purely hydrodynamic theories seem to demand an extensive hot corona surrounding the star for which no observational evidence is available. Both the constant-velocity nature of the flow as well as the observation that ejection seems to set in very suddenly with B -- V appear to suggest strongly a mechanism involving the formation of grains. The model now proposed is one in which graphite grains forming near the photospheric boundary serve to couple the radiation field to the gas and continually remove mass from the star. Weymann discusses this possibility briefly but is led to reject it, partly on account of the lack of plausibility of the idea that ice-like grains can condense in the high-temperature envelope and partly on account of a large drift velocity which he obtains for the ice grains relative to the gas. The same conclusions, however, do not appear to hold for the case of graphite particles with dimensions of a few hundredths of a micron.
AD-646 787 Not available from CFSTI.

THE IRON GROUP ELEMENTS AND THE EQUILIBRIUM PROCESS IN NUCLEOSYNTHESIS,
California Inst. of Tech., Pasadena.
W. A. Fowler. 1966, 14p
Contract Nonr-220 (47), Grant NGR-05-002-028
Availability: Published in Abundance Determinations in Stellar Spectra Symposium (26)p335-47 1966.

Descriptors: (*Stars, Thermonuclear reactions), (*Nuclei, Stars), (*Supernovae, Nuclear reactions), Neutrinos, Positrons, Emissivity, Electron capture, Neutrons, Nuclear structure, Nuclei, Transition elements, Radioactive decay, Abundance, Spectroscopy.
Identifiers: Stellar evolution.

The following question is considered: In the time scale permitted by the neutrino losses, how far will the beta-processes go in producing nuclei with a neutron excess. In other words, in the 'equilibrium' or e-process in which the iron-group abundances are finally determined, does the material come to the complete equilibrium corresponding to the ambient temperature and density or does the limited reaction rate of the beta-processes impose an additional constraint. It is assumed that solar-system iron-group nuclei are typical of nuclei produced in the e-process just outside the imploding central regions of type II supernovae. These nuclei reside in the material which is swept out by the explosion of the mantle and envelope of the star. This explosion occurs in such a short time interval that the quasi-equilibrium abundances reached before the implosion-explosion are essentially unchanged. A significant connection is found between iron-group abundances and the time scale set by neutrino losses during the stellar stage just prior to core implosion and mantle-envelope explosion.
AD-646 788 Not available from CFSTI.

LTE MODEL ATMOSPHERES WITH LINE BLANKETING. REVIEW AND FUTURE PROSPECTS,
Princeton Univ., N. J. Observatory.
D. Mihalas. 1966, 12p
AFOSR-67-0319
Contract AF 49 (638)-1555
Availability: Published in J. Quant. Spectrosc. Radiat Transfer v6 p581-90 1966.

Descriptors: (*Stars, *Atmosphere models), Spectroscopy, Line spectrum, Thermodynamics, Mathematical analysis, Colors, Temperature, Reviews.
Identifiers: Local thermodynamic equilibrium.

A review is given on the computation of model stellar atmospheres, with particular emphasis given to the local thermal equilibrium (LTE) model with line blanketing.
AD-646 813 Not available from CFSTI.

STABILITY OF SPIRAL MOTION,
Yale Univ., New Haven, Conn. Observatory.
V. Szebehely. 1966, 12p
AFOSR-67-0293
Grant AF-AFOSR-397-65
Availability: Published in International Astronomical Union Symposium n25 p34-42 1966.

Descriptors: (*Galaxies, *Particle trajectories), Potential theory, Equations of motion, Stability, Gravity, Differential equations, Functions.

The stability of the motion of particles in spiral orbits is investigated. The force field is represented by the potential function f = C (exp a (phi) (r to the nth) limiting case of which is the Newtonian gravitational field (n = 1, a = 0). Particular solutions of the equations of motion are shown to be logarithmic spirals. A linearized stability analysis leads to a fourth order system of differential equations with variable coefficients. Complete solution of this system is obtained showing a rather complex stability situation in which outward motions are always associated with instability while inward motions might be stable or unstable depending on the value of the constants a and n occurring in the above potential function. (Author)
AD-646 840 Not available from CFSTI.

SOLAR FILAMENT STRUCTURE.
Final rept., 29 Nov 65-28 Nov 66,
Lockheed-California Co., Burbank. Physical and Life Sciences Lab.
Harry E. Ramsey, and Sara F. Smith. Dec 66, 44p
LR-20444
Contract N00014-66-C-0059, ARPA Order-215

Descriptors: (*Solar disturbances, Analysis), (*Solar flares, Predictions), Solar atmosphere, Photographic analysis, Resolution, Line spectrum, Sunspots, Periodic variations.
Identifiers: Solar filaments, Solar plages.

A survey was made of the Lockheed solar patrol films in search of any parameters which could possible be linked with the occurrence of flares. High resolution observations (< or = 1 sec of arc) show that some filaments increase in darkness and become more sharply defined within several hours to several days before the onset of a flare. However, if obtained only in the center of H-alpha, high resolution observations do not allow one to predict the onset times of flares any better than with observations of lower resolution. For flare prediction the utility of high resolution observations in the center of H-alpha is in enabling one to locate the positions of polarity change around which flares occur in an active center. Complex plage system were defined as a combination of two adjacent plages or the growth of new plage in the midst of older plage. It is shown that such complex systems rarely fail to produce at least one major flare. The frequency of flaring in a complex system, however, does not appear to be statistically greater than for plages which are not complex according to the above definition. A few examples of preflare changes in fibrils were analyzed. These changes are thought to be related to short period, preflare changes in filaments because of their similarity in time of occurrence, position with respect to the ensuing flares, and general outward motion. (Author)
AD-646 849 HC$3.00 MF$0.65

RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Columbia Radiation Lab., New York.
For primary bibliographic entry see Field 9C.
AD-646 898 HC$3.00 MF$0.65

PHYSICS OF COMETS AND METEORS.
Israel Program for Scientific Translations, Ltd., Jerusalem.
V. P. Konopleva. 1966, 110p NASA-TT-F-340, TT-67-51213
Transl. Into English Of The Book "fizika Komet I Meteorov" Kiev, Izd. Naukova Dumka, 1965 Published For Nasa And Nsf

Descriptors: *Comet, *Meteor, *Physics, Brightness, Density, Dissociation, Drift, Echo, Electron, Geminid meteor, Ionization, Observation, Orbit, Photometry, Radio, Trail.

For abstract, see STAR 05 06.
N67-15441 HC$3.00 MF$0.65

PHYSICS OF THE SOLAR SYSTEM, VOLUME 3.
Israel Program for Scientific Translations, Ltd., Jerusalem.
A. A. Mikhailov. 1966, 398p NASA-TT-F-342, TT-66-51022
Transl. Into English Of The Book "kurs Astrofiziki I Zvezdnoi Astronomii" Moscow, Izd. Nauka, 1964 Published For Nasa And Nsf

Descriptors: *Astrophysics, *Solar atmosphere, *Solar physics, *Solar system, Astronomy, Atmosphere, Chromosphere, Comet, Corona, Emission, Flare, Light, Line, Meteor, Moon, Observation, Photosphere, Physical, Physics, Planet, Prominence, Property, Radio, Solar, Spectrum, Stellar, Structure, Survey, System, Zodiac.

For abstract, see STAR 05 06.
N67-15484 HC$3.00 MF$0.65

EXPERIMENTAL AND THEORETICAL STUDIES IN PLANETARY AERONOMY QUARTERLY PROGRESS REPORT, 17 SEP. - 30 NOV. 1966.
Gca Technology Div., Gca Corp., Bedford, Mass.
F. F. Marmo. Dec 66, 131p NASA-CR-81262, QPR-7
Contract NASW-1283

Descriptors: *Aeronomy, *Photochemistry, *Planetary atmosphere, Atmosphere, Cloud, Cooling, Electron, Gas, Hot, Ion, Molecule, Observation, Photoionization, Planetary, Rate.

For abstract, see STAR 05 06.
N67-16515 HC$3.00 MF$0.65

REMARKS ON THE INTERPRETATION OF LUNIK 10 MAGNETOMETER RESULTS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 05 06.
N67-16551 HC$3.00 MF$0.65

DEVELOPMENT OF TECHNOLOGICAL CONCEPTS LEADING TO THE BENEFICIAL USE OF LUNAR MAGMA PRODUCTS TECHNICAL PROGRESS REPORT, OCT. - DEC. 1966.
Northrop Space Labs., Hawthorne, Calif.
E. Azmon. Dec 66, 4p NASA-CR-81339
Contract NAS7-358

Descriptors: *Lunar soil, *Magma, *Olivine, *Petrography, Application, Basalt, Casting, Dust, Forming, Geometry, Lunar, Obsidian, Property, Serpentine, Soil.

For abstract, see STAR 05 06.
N67-16619 HC$3.00 MF$0.65

A PROPOSAL FOR A VERY LARGE ARRAY RADIO TELESCOPE. VOLUME II. SYSTEMS DESIGN.
National Radio Astronomy Observatory, Green Bank, W. Va.
For primary bibliographic entry see Field 9E.
PB-173 913 HC$3.00 MF$0.65

3C. CELESTIAL MECHANICS

ESTIMATES OF THE REMAINDERS OF HILL'S SERIES.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
M. S. Petrovskaya. 30 Sep 66, 28p FTD-HT-66-241
TT-67-60787
Edited trans. of Akademiya Nauk SSSR. Institut Teoreticheskoi Astronomii. Byulleten, v9 n4 p257-73 1963.

Descriptors: (*Power series, Approximation (Mathematics)), (*Celestial mechanics, Approximation (Mathematics)), Convergence, Equations of motion, Errors, USSR.
Identifiers: Hill's series, Lyapunov method.

Estimates of the remainders in Hill's series are obtained for cases where the coefficients in these series which are series in powers of m = n sub 0/(n sub 1-n sub 0) (where n sub 0 and n sub 1 are the mean angular velocities of the sun and the moon), are computed with accuracy to the 2nd, 3rd, 4th, 5th, and 6th powers of m. New estimates are also obtained for the remainders of Hill's series expanded in powers of m to the 2nd, which were examined in Lyapunov's paper (1954). The estimates are obtained for the case of m < o = sigma (approx. 0.080849), where sigma is the value of the parameter m for the moon.
AD-646 449 HC$3.00 MF$0.65

SELECTION OF A VLF RECEIVING ANTENNA FOR THE BOLIVIAN SOLAR ECLIPSE SITE.
Naval Ordnance Lab., Corona, Calif.
For primary bibliographic entry see Field 9E.
AD-646 629 HC$3.00 MF$0.65

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4. ATMOSPHERIC SCIENCES

4A. ATMOSPHERIC PHYSICS

A COMPILATION OF SELECTED DATA ON SOLAR RADIATION AT SEA LEVEL.
Technical memo.,
Navy Marine Engineering Lab., Annapolis, Md.
B. H. Morgan. Feb 67, 21p MEL-TM-3/67

Descriptors: (*Solar radiation, Measurement), Atmosphere, Wave transmission, High altitude.

A spectral distribution curve of solar irradiance at sea level, over the range of 0.3 to 15.0 microns, is presented. This curve was developed from data compiled by Moon in 1940, high altitude solar irradiance measurements reported by Johnson in 1954, and atmosphere transmission measurements reported by Gebbie, et al, in 1951. (Author)
AD-646 355 HC$3.00 MF$0.65

TIME DEPENDENT NEUTRON TRANSPORT FROM A POINT ISOTROPIC SOURCE AT AN ALTITUDE OF (9.144 KM) 30,000 FT.
Braddock, Dunn, and McDonald, Inc., El Paso, Tex.
For primary bibliographic entry see Field 18H.
AD-646 458 HC$3.00 MF$0.65

STUDIES OF THE CHEMISTRY OF UNPOLLUTED ATMOSPHERES.
Final rept.,
Stanford Research Inst., Menlo Park, Calif.
Christian E. Junge. 10 Nov 66, 114p
Contract CwB-11151
Prepared in cooperation with Mainz Univ. (West Germany).

Descriptors: (*Atmosphere, Chemical properties), (*Troposphere, *Aerosols), Particle size, Distribution, Chlorides, Sulfur, Sea water, Sprays, Pacific Ocean, Altitude, Samplers, Chemical analysis, West Germany.

Measurements of aerosol concentration and size distribution were made with a light scattering type particle counter and condensation nuclei counters at sea level and 2200 meter altitudes using sites at Cape Blanco, and Crater Lake, Oregon. The data collected in marine air masses support earlier findings of sea-spray aerosol size distributions and lack of chemical fractionation during bubble burst aerosol formation. The data indicate that significant amounts of sea spray aerosol do not penetrate to low and mid-tropospheric altitudes above 2000 meters. The aerosols typical of this elevation were found to have size distributions well approximated by a power law with an exponent of 3 to 4. They were found to have sulfur to chloride ratios of about 8 and considerable concentrations of substances other than sulfur and chloride. High altitude tropospheric air mass aerosols, observed on this program at Crater Lake during periods of subsidence, have lower concentrations than found for lower altitude tropospheric aerosols and their power law representations are characterized by lower exponential values. (Author)
AD-646 465 HC$3.00 MF$0.65

ATMOSPHERIC DENSITY DETERMINATION FROM LOW HEIGHT SATELLITES.
Interim rept.,
International Business Machines Corp., Cambridge, Mass. Cambridge Advanced Space Systems Dept.
Arnold S. Bramson, and Jack Slowey. Nov 66, 53p Scientific-3
AFCRL-6-809
Contract AF 19(628)-4192
See also AD-634 785.

Descriptors: (*Atmospheric sounding, Density), (*Computer programs, Atmospheric sounding), Drag, Upper atmosphere, Scientific satellites, Orbital trajectories, Perturbation theory, Atmosphere models, Numerical analysis, Low-orbit trajectories.
Identifiers: IBM 7090/7094, FORTRAN.

The report describes the third in a series of computer programs designed to determine atmospheric density from an analysis of satellite observations. The particular approach being reported upon consists of a numerical integration procedure combined with a differential correction scheme where discrepancies between computed and observed satellite position and velocity are reconciled by adjusting the assumed atmospheric model, thereby yielding corrected or refined density data. An important advantage of this technique is its applicability to satellites entering the decay stage where the effects of atmospheric drag are considerable and where a relatively short time span of observations may be available. Numerical results obtained from the program are presented along with an interpretation and an evaluation of these computer results. Finally, a complete user's manual is included as a separate appendix. (Author)
AD-646 584 HC$3.00 MF$0.65

SUMMARY OF THE CONFERENCE ON THE OPTICAL PROPERTIES OF AEROSOLS, 15-17 OCTOBER 1964, ONCHIOTA CONFERENCE CENTER, STERLING FOREST, TUXEDO, NEW YORK.
New York Univ., N. Y. Geophysical Sciences Lab.
E. A. Chermack. Jul 65, 61p Rept. no. 65-5
Contract DA-36-039-AMC-03411 (E)

Descriptors: (*Symposia, *Aerosols), (*Optical properties, Aerosols), Physical properties, Chemical properties, Atmosphere, Particles, Optical phenomena, Solar radiation, Ultraviolet radiation.
Identifiers: Radiative transfer.

The purpose of the conference was to ascertain the state of knowledge and to determine the problem areas in this field of atmospheric physics. It was held over a period of three days, each day being devoted to a problem area as introduced and outlined by a survey speaker. Following the survey talk, morning and evening discussion sessions were convened. Each session was presided over by a chairman who also acted as moderator of the informal discussion. Prior to the conference, the invited participants were asked to submit brief resumes of their current research interest in the problem areas to be discussed and these were forwarded to the chairmen. The sessions were kept as informal as possible in order to facilitate the free flow of information, opinion, and ideas. The chairman maintained and directed the thread of the discussion by calling upon participants to present their views as the discussion turned into their spheres of interest. The number of participants was limited to about fifty meteorologists, atmospheric physicists, chemists, and engineers working actively in the field. This was necessary because the sponsors wished to insure informality, freedom of expression, and of course, to avoid the problem of overlapping on concurrent sessions. This report is a summary of the conference discussion. Each day's discussion summary is preceded by the survey speaker's remarks. Discussion summaries were prepared by the respective chairman and represent the salient features of each day's meetings.
AD-646 612 HC$3.00 MF$0.65

DRAG MEASUREMENTS IN A STREAM WITH SINUSOIDALLY FLUCTUATING VELOCITY IN THE LONGITUDINAL DIRECTION.
Army Aviation Materiel Labs., Fort Eustis, Va.
For primary bibliographic entry see Field 20D.
AD-646 643 HC$3.00 MF$0.65

SOME PROPERTIES OF ATTENUATION IN THE ATMOSPHERE.
Research translation,
American Meteorological Society, Boston, Mass.
V. E. Zuev, and M. V. Kabanov. Nov 66, 9p T-R-627
TT-67-60869
Contract AF 19(628)-3880
O Nekotorykh Osobennostyakh Oslableniya Sveta v Atmosfere, trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Fizika (USSR), n6 p175-7 1965.

Descriptors: (*Atmosphere, *Attenuation), Light transmission, USSR, Light, Photometers, Diffusion, Boundary layer, Atmospheric motion.

The article reports some results of experimental investigations of attenuation carried out under average turbidity conditions for three portions of the spectrum (0.43, 0.68, and 1.03mu) and for three horizontal thicknesses of the atmospheric surface boundary layer (1.21, 3.65, and 9.86 km). The immediate object of the measurement series was to obtain experimental data on the amount of diffuse radiation in 3.65 km thicknesses of the real atmosphere for small angular apertures of the receiver, and to compare these data with the theoretical data obtained earlier. The results of the experiments show that the role of diffused light under typical average turbidity conditions in the atmospheric surface boundary layer (visibility 10 to 15 km) is not constant.
AD-646 679 HC$3.00 MF$0.65

CLOUD DROPLET MICROWAVE DISPERSION EFFECTS ON LINE INTEGRAL REFRACTOMETER MEASUREMENTS,
Mitre Corp., Bedford, Mass.
L. J. Galbiati. Oct 66, 107p MTR-53
ESD-TR-66-78
Contract AF 19 (628)-5165

Descriptors: (*Microwaves, Scattering), (*Atmospheric refraction, Measurement), Refractometers, Errors, Clouds, Troposphere, Water, Phase measurement.

The magnitude and characteristic of the effect of cloud-droplet microwave dispersion on line integral refractometer (LIR) measurements was determined for environmental conditions measured at the Eastern Test Range on August 7, 8, and 9, 1963. It was definitely determined that the presence of cloud droplets would introduce errors in the LIR measurements, but that, on each of the above days, there were regions of the sky where the error introduced was small compared to the total refraction correction. The report describes technical areas where basic data were inadequate and discusses the impact of assumptions made in these areas on the calculated values. (Author)
AD-646 718 HC$3.00 MF$0.65

THE ALOUETTE II SATELLITE,
Defence Research Telecommunications Establishment, Ottawa (Ontario).
For primary bibliographic entry see Field 22B.
AD-646 816 Not available from CFSTI.

EVALUATION OF THE CONSTANT MOMENTUM MASS SPECTROMETER FOR IONOSPHERIC INVESTIGATIONS.
Pennsylvania State Univ., University Park. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 20F.
For abstract, see STAR 05 06.
N67-15457 HC$3.00 MF$0.65

THE OUTERMOST BELT OF CHARGED PARTICLES.
Samyy Vneshniy Poyas Zaryazhennykh Chastits
Consultants and Designers, Inc., Arlington, Va.
K. I. Gringauz, and M. Z. Khokhlov. 17 Nov 65, 24p NASA-CR-81276, ST-PF-GM-10413
Contract NAS5-3760
Transl. Into English From Issl. Kosmich. Prostranstva Tr. Vsesoyuznoy Konf. Po Kosmich. Lucham (Moscow), Jun. 1965 P 467-482

Descriptors: *Charged particle, *Electron flux, *Outer radiation belt, Belt, Charge, Distribution, Electron, Flux, Geomagnetic, Geophysics, Latitude, Low energy, Magnetosphere, Outer, Particle, Probe, Proton, Radiation, Soft, Space, Spatial.

For abstract, see STAR 05 06.
N67-16505 HC$3.00 MF$0.65

ON THE COULOMB RELAXATION PROCESS OF FAST PARTICLES' DISTRIBUTION IN THE EARTH'S RADIATION BELTS.
O Protsesse Kulonovskoy Relaksatsii Rasprede Eviya Bystrykh Chastits V Radiatsionnykh Poyasakh Zemli
Consultants and Designers, Inc., Arlington, Va.
G. A. Timofeyev. 10 Nov 65, 6p NASA-CR-81275, ST-PF-10410
Contract NAS5-3760
Transl. Into English From Geomagnetizm I Aeronomiya (Moscow), V. 5, No. 4, 1965, P 754-756

Descriptors: *Coulomb collision, *Fast electron, *Radiation belt, Belt, Cold, Diffusion, Earth, Electron, Equation, Fast, Ion, Kinetic, Plasma, Process, Radiation, Reflection, Relaxation.

For abstract, see STAR 05 06.
N67-16507 HC$3.00 MF$0.65

THE BEHAVIOR OF PARTICLES OF RADIATION BELTS DURING MAGNETIC STORMS.
O Povedeniy Chastits Radiatsionnykh Poyasov Vo Vremya Magnitnykh Bur'
Volt Technical Corp., Washington, D. C.
V. P. Shabanskiy. 14 Oct 66, 12p NASA-CR-81271, ST-PF-GM-10518
Contract NAS5-12487
Transl. Into English From Geomagnetizm I Aeronomiya (Moscow), V. 6, No. 3, 1966 P 479-485

Descriptors: *Magnetic storm, *Radiation belt, *Trapped particle, Belt, Current, Disturbance, Magnetic, Particle, Radial, Radiation, Reflection, Ring, Shell, Solar, Storm, Transition, Trap, Wind.

For abstract, see STAR 05 06.
N67-16508 HC$3.00 MF$0.65

VAN ALLEN BELT PLASMA PHYSICS.
Avco-everett Research Lab., Everett, Mass.
C. F. Kennel, and H. E. Petschek. Dec 66, 84p NASA-CR-81257, AVCO-EVERETT RES. REPT.-259
Contracts NASW-1400, AF 49/638/-1483

Descriptors: *Plasma physics, *Turbulence, *Van allen belt, Diffusion, Electron, Geophysics, Ion, Physics, Plasma, Space, Stability, Velocity, Wave.

For abstract, see STAR 05 06.
N67-16511 HC$3.00 MF$0.65

AN EXPERIMENT TO DETECT MICROORGANISMS IN THE UPPER ATMOSPHERE FLOWN ON AEROBEE NASA 4.150.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 6M.
For abstract, see STAR 05 06.
N67-16545 HC$3.00 MF$0.65

THE IONOSPHERE AT 640 KILOMETERS ON QUIET AND DISTURBED DAYS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
L. H. Brace, J. A. Findlay, and B. M. Reddy. Dec 66, 67p NASA-TM-X-55646, X-621-66-574

Descriptors: *Electron probe, *Ionospheric electron density, *Solar activity effect, *Tiros iv satellite, Activity, Density, Disturbance, Diurnal, Effect, Electron, Electrostatic, Equator, Ionospheric, Magnetic, Meteorology, Polar, Probe, Quiet, Region, Satellite, Solar, Variation.

For abstract, see STAR 05 06.
N67-16548 HC$3.00 MF$0.65

MEASURED TEMPERATURE STRUCTURE IN NOCTILUCENT CLOUDS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
W. Nordberg, W. S. Smith, and J. S. Theon. Dec 66, 21p NASA-TM-X-55648, X-621-66-597

Descriptors: *Atmospheric temperature, *Noctilucent cloud, *Temperature effect, Acoustic, Altitude, Atmospheric, Circulation, Cloud, Effect, Grenade, Mesopause, Mesosphere, Noctilucence, Sounding, Temperature, Vapor, Variation, Water.

For abstract, see STAR 05 06.
N67-16550 HC$3.00 MF$0.65

TEMPORAL VARIATIONS OF MESOSPHERIC OXYGEN AND OZONE DURING AURORAL EVENTS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A. C. Aikin, and K. Maeda. Jan 67, 72p NASA-TM-X-55651, X-640-67-29

Descriptors: *Auroral activity, *Mesosphere, *Oxygen atom, *Ozone, Activity, Atmosphere, Atom, Aurora, Dissociation, Distribution, Electron, Impact, Molecule, Oxygen, Photochemistry, Reaction, Time, Variation.

For abstract, see STAR 05 06.
N67-16552 HC$3.00 MF$0.65

THEORY OF ELECTROSTATIC PLANAR AND SPHERICAL PROBES.
Mount Auburn Research Associates, Inc., Cambridge, Mass.
L. W. Parker. Jan 67, 98p NASA-CR-704
Contract NAS5-9088

Descriptors: *Current density, *Electrostatic plasma, *Particle trajectory, *Plasma probe, Calculation, Current, Density, Domain, Electrostatic, Expression, Numerical, Particle, Physics, Planar, Plasma, Probe, Shape, Spherical, Theory, Trajectory.

For abstract, see STAR 05 06.
N67-16671 HC$3.00 MF$0.65

VARIABILITY OF SOUND PROPAGATION PREDICTION DUE TO ATMOSPHERIC VARIABILITY FINAL REPORT.
Kaman Aircraft Corp., Colorado Springs, Colo. Nuclear Div.
For primary bibliographic entry see Field 4B.
For abstract, see STAR 05 06.
N67-16681 HC$3.00 MF$0.65

TURBULENCE IN CLEAR AIR NEAR THUNDERSTORMS.
Technical memorandum,
Royal Aircraft Establishment, Farnborough (England).
Anne Burns, Terence W. Harrold, Jack Burnham, and Clifford S. Spavins. Dec 66, 25p
IERTM-NSSL-30

Descriptors: (*Clear air turbulence, Thunderstorms), (*Aeronautics, Clear air turbulence), Meteorological radar, Aircraft, Flight, Storms, Atmospheric motion, Atmospheric temperature, Great Britain.

Contents: Some results of a study of atmospheric turbulence in clear air above thunderstorms and of its relationship to weather radar pictures, by J. Burnham and C. S. Spavins; An atmospheric disturbance encountered by a canberra over storms at Oklahoma on May 27, 1965, by Anne Burns and T. W. Harrold.
PB-173 992 HC$3.00 MF$0.65

SOME GEOMAGNETIC AND IONOSPHERIC EFFECTS IN ANTARCTICA PRIOR TO STORM SUDDEN COMMENCEMENTS.
Technical operating rept.,

Avco Corp., Wilmington, Mass. Avco Space Systems Div.
G. G. Bowman. Aug 66, 34p Scientific-23, AVSSD-0149-66-CR
Contract NSF-C403
Antarctic Research and Data Analysis.

Descriptors: (*Magnetic storms, *Antarctic regions), (*Ionospheric disturbances, Magnetic storms), Terrestrial magnetism, Analysis, Ionospheric propagation, Atmospheric electricity.

Ionospheric height changes, blackout conditions, and geomagnetic activity for Antarctica in the relatively quiet times (geomagnetically) before storm sudden commencements are investigated. The principal results give evidence for 24-hourly periodicities in these parameters, and suggest that 24 hours before storm sudden commencements the occurrence of negative magnetic bays and auroral zone ionospheric height rises is enhanced. The implications of these and other relevant observations are discussed, and some ideas involving intense local dumping of low-energy outer-zone electrons at 24-hourly intervals are advanced. (Author)
PB-173 998 HC$3.00 MF$0.65

DIRECTIONAL CHARACTERISTICS OF IONOSONDE INTERFERENCE PATTERNS FROM THE FILCHNER ICE SHELF.
Antarctic research and data analysis,
Avco Corp., Wilmington, Mass. Avco Space Systems Div.
Gordon G. Bowman. 13 Oct 66, 40p Scientific-24, AVSSD-0224-66-CR
Contract NSF-C403

Descriptors: (*Ice, Reflectivity), (*Ionospheric disturbances, *Antarctic regions), (*Atmospheric sounding, Interference), Energy.
Identifiers: Filchner ice shelf.

Interference effects appear on vertical-incidence ionograms from Ellsworth Station, which is located on the Filchner ice shelf in Antarctica. These effects are caused by energy which travels through the ice and is reflected upwards at the bottom of the ice shelf. Because the frequencies at which the nulls of the interference pattern occur change in a systematic way for off-vertical reflections, it has been possible to calibrate the ionosonde system so that the angle-of elevation of off-vertical traces can be calculated. This calibration has allowed a calculation of the ice thickness and the dielectric constant of the ice. It also gives information on the behavior of the ionosphere when off-vertical eflections are present. In particular, it has allowed the detection of large-scale ionospheric disturbances which are observed at Ellsworth in the early evening hours. Ionosondes coupled to antenna systems, which would make them swept-frequency interferometers, have been suggested. These systems would produce interference patterns similar to those produced by the Filchner ice shelf. (Author)
PB-173 999 HC$3.00 MF$0.65

THE NATURE OF SPREAD-F IRREGULARITIES IN ANTARCTICA.
Antarctic research and data analysis,
Avco Corp., Wilmington, Mass. Avco Space Systems Div.
Gordan G. Bowman. 21 Dec 66, 54p Scientific-25, AVSSD-0322-66-CR
Contract NSF-C403

Descriptors: (*Ionospheric disturbances, *Antarctic regions), Magnetic storms, Atmospheric sounding, Gas ionization, Ionospheric propagation.

Some characteristics of spread-F ionograms from the Antarctic region are discussed. Very disturbed periods, such as when magnetic storms are in progress, have been neglected in this analysis. Two important characteristics are the frequent occurrence of resolved as well as diffuse traces, and the appearance from time to time of an enhanced trace which seems to arrive from directions close to the magnetic-field direction. Two independent sets of spread-F traces are reported. Several possible models are examined and some ray tracing performed. The analysis favors a model which incorporates kinking of the contours of equal ionization density to produce 'wavelengths' in the ionospheric structure of some tens of kilometers. Because of the similarities at mid- and high-latitude regions, it is suggested that similar mechanisms are operating at both regions to produce spread F. (Author)
PB-174 000 HC$3.00 MF$0.65

EXTREMELY LARGE TRAVELING IONOSPHERIC DISTRUBANCES IN ANTARCTICA.
Antarctic research and data analysis,
Avco Corp., Wilmington, Mass. Avco Space Systems Div.
Gordon G. Bowman. 10 Jan 67, 54p Scientific-26, AVSSD-0354-66-CR
Contract NSF-C403

Descriptors: (*Ionospheric disturbances, *Antarctic regions), (*Ice, Reflectivity), Atmospheric sounding, Ionospheric propagation, Atmospheric sounding, Aurorae, Terrestrial magnetism.
Identifiers: Filchner ice shelf.

Direction-of-arrival information is available on ionograms from Ellsworth, Antarctica because of interference effects from the Filchner Ice Shelf. This has allowed the detection of extremely large traveling ionospheric disturbances which appear to move towards the equator in the vicinity of the auroral zone, in the hours before local midnight. These disturbances produce large troughs in the bottomside ionosphere have widths as large as 1000 kilometers. In the troughs the f sub oF2 values fall by factors which vary between 3 and 7 for the cases investigated. Disturbance effects are also recorded in the D and E layers. Associations with radio and optical auroras and magnetic activity have been found which suggest that these disturbances are intimately related to auroral-zone activity. Speeds of the order of 100 m/sec are found. It is suggested that the disturbances result from the propagation of internal gravity waves generated at magnetic noon at a magnetic latitude of about 80 degrees. (Author)
PB-174 001 HC$3.00 MF$0.65

CONDENSATION OF DRY AIR ON A LIQUID HYDROGEN COOLED SURFACE IN THE PRESSURE RANGE .001 TO 10 tor (KNUDSEN NUMBER OF .0001 TO 1),
National Bureau of Standards, Boulder, Colo. Cryogenics Div.
For primary bibliographic entry see Field 20M.
PB-174 024 HC$3.00 MF$0.65

FRITZ PEAK OBSERVATIONS OF STABLE AURORAL RED ARCS: SUMMARY 1955-1965.
Technical rept.,
Institutes for Environmental Research, Boulder, Colo.
E. Marovich. Dec 66, 73p ITSA-16 IER-16

Descriptors: (*Aurorae, Night Sky), Sky brightness, Colorado, Photometers, Data, Graphics.

Eleven years' records of observations of the night sky over Fritz Peak (105 deg 29 minW, 39 deg 54 minN) have been examined in a consistent manner to find occurrences of mid-latitude red arcs (SAR-arcs). Those used were nights when the sky was generally clear and the moon absent part or all night. Arcs were found to be present during 29 such nights, with an additional 22 nights with arcs possibly present. The data are described and tabulated. (Author)
PB-174 053 HC$3.00 MF$0.65

4B. METEOROLOGY

WEATHER FACTORS AFFECTING AERIAL PHOTOGRAPHY AND OPERATIONS IN TANGANYIKA, UGANDA AND KENYA.
Weather Wing (7th), Scott AFB, Ill.
Jan 66, 77p

Descriptors: (*Aerial photography, Subsaharan Africa), (*Flight, Subsaharan Africa), (*Weather, *Subsaharan Africa), Meteorological parameters, Meteorological phenomena, Climatology, Tanganyika, Kenya.
Identifiers: Uganda.

Contents: General weather and climatic conditions, climatic controls, area climatology, special weather phenomena; Air operations, cloudiness, thunderstorms and turbulence, upper-air winds, upper-air temperatures and aircraft icing, air-ground operations, thunderstorms and turbulence, low cloudiness, visibility, low-level temperatures inversions; Ground operations, precipitation, snow cover, temperature, relative humidity, surface winds, visibility; Tabular data; Figures and charts; Daylight information, duration of daylight, duration of time with sun angle at least 30 deg. above the horizon; Refractive index, Nairobi, Kenya.
AD-646 356 HC$3.00 MF$0.65

WEATHER FACTORS AFFECTING AERIAL PHOTOGRAPHY AND OPERATIONS IN FRENCH SOMALILAND AND SOMALI REPUBLIC.
Weather Wing (7th), Scott AFB, Ill.
Jan 66, 51p

Descriptors: (*Aerial photography, Subsaharan Africa), (*Flight, Subsaharan Africa), (*Weather, *Subsaharan Africa), Meteorological parameters, Climatology, Meteorological phenomena.
Identifiers: French Somaliland, Somali Republic.

Contents: General weather and climatic conditions - climatic controls, special phenomena; Air Operations - cloudiness, thunderstorms and turbulence, upper-air winds, upper-air temperatures and aircraft icing; Air-ground operations - low cloudiness and ceilings, visibility; Ground surface operations - temperature, relative humidity, precipitation; Tabular statistics; Daylight information - duration of daylight, duration of time with sun at least 30 deg above the horizon; Figures and charts.
AD-646 357 HC$3.00 MF$0.65

AN IMPROVED ANEMOMETER FOR LOW-LEVEL WINDS. PHASE I. DESIGN PLAN.
Technical rept.,
Stanford Research Inst., Menlo Park, Calif.
S. K. Oleson. Sep 61, 39p TR-1
Contract DA-36-039-sc-87311

Descriptors: (*Anemometers, Design), Wind, Meteorological instruments, Wake, Sound, Velocity.

A design plan has been developed for a sonic anemometer with a sonic path length of less than 1 ft and with high accuracy. The configuration of the sonic portion of the anemometer consists of a horizontal square array of four receivers placed symmetrically above a transmitter located on the vertical axis of symmetry. A fifth receiver is placed on this axis, either in the plane of the other four receivers or slightly above it. Over-all dimensions are less than 1 ft. Designs conceived for the small source of intense sound required include a hydraulically-driven radially-vibrating sphere, arrays of small tubes radiating from their open ends, and bimorph elements constructed of quartz or lead-zirconate disks. It is expected that spherical or hemispherical piezoelectric ceramics will be

used as receivers. Theoretical and experimental studies led to the conclusion that the choice of sound transmission frequency for the sonic anemometer will be a compromise between the power-output-versus-frequency characteristics of the smallest transducers that are practicable, and the effects on sound propagation of wakes or atmospheric inhomogenieties in the sound path length. Phase measurements of continuously transmitted sound will provide the basis for measuring wind velocity components. (Author)
AD-646 605 HC$3.00 MF$0.65

AN IMPROVED ANEMOMETER FOR LOW-LEVEL WINDS. PHASES II AND III--DEVELOPMENT OF A SONIC ANEMOMETER MODEL.
Technical rept.,
Stanford Research Inst., Menlo Park, Calif.
S. K. Oleson. May 63, 56p TR-2
Contract DA-36-039-sc-87311

Descriptors: (*Anemometers, Acoustic equipment), Theory, Transducers, Design, Performance (Engineering).

A prototype sonic anemometer was developed for measuring the horizontal wind velocity from 0 to 50 mph over sonic path lengths of less than one foot. The transducer configuration consists of a horizontal square array of four receivers placed symmetrically above a transmitter located on the vertical axis of symmetry. A fifth receiver, placed slightly above the plane of the other four receivers, furnishes a measure of the vertical component of windspeed. Overall dimensions are less than one foot. Phase difference measurements between each pair of diagonally opposite receivers furnish the measurement of the horizontal wind velocity. The analog output of the vertical windspeed component provides a correction factor needed for computing the horizontal windspeed to the required degree of accuracy. Wind direction is determined by presenting the electrical representation of each horizontal wind vector to the deflection plates of a cathode-ray tube and monitoring the angular deflection of the signal with a photoelectric detector. (Author)
AD-646 606 HC$3.00 MF$0.65

NUMERICAL INTERPRETATION OF CLOUD INFORMATION FROM METEOROLOGICAL SATELLITES.
Research trans.,
American Meteorological Society, Boston, Mass.
Sh. A. Musaelyan, and A. Z. Chekirda. Oct 66, 19p T-R-468
TT-67-60856
Contract AF 19(628)-3880
O Chislennoi Interpretatsii Informatsii ob Oblachnosti, Postupayushchei s Meteorlogicheskikh Sputnikov, trans. of Glavnaya Geofizicheskaya Observatoriya, Leningrad. Trudy (USSR), n166 p189-202 1964.

Descriptors: (*Meteorological satellites, Clouds), (*Clouds, Northern hemisphere), Cloud cover, Atmospheric motion, Fourier analysis, Series, Least squares method, Meteorological charts, Weather forecasting, Meteorological phenomena.

Determination of the cloud field from the vertical motion field is a problem of long standing, and now we are concerned with the opposite problem, determination of the vertical motion field from the cloud field. This new problem has arisen in connection with meteorological satellites which provide information, basically, on radiation characteristics and on the state of the earth's cloud cover. This information must be employed operationally and with maximum efficiency by meteorologists. The structure and dimensions of various cloud formations and their inherent characteristic features in various synoptic situations may be established on the basis of satellite photographs of cloud systems. It is especially important to obtain such information from regions where meteorological observations are rarely made. Many meteorologists are concerned with synoptic interpretation of information on cloud systems. This interpretation, in final analysis, amounts to a visual study of the cloud field and the introduction of corrections (sometimes quite substantial) into the surface chart, especially for regions where surface information is scanty or entirely lacking. Numerical forecasting requires a quantitative interpretation of cloud information, not a qualitative synoptic interpretation. In the present paper we propose a method of determining the vertical motion field from the cloud distribution.
AD-646 617 HC$3.00 MF$0.65

A RAINDROP SPECTROMETER AND AN AUTOMATIC LIQUID-WATER-CONTENT METER,
Technical Operations, Inc., Burlington, Mass.
Calvin Y. Sing, and Anthony F. Souza. 20 Jan 66, 50p Scientific-1, TO-B-65-1
AFCRL-66-782
Contract AF 19(628)-3813

Descriptors: (*Raindrops, *Spectrum analyzers), (*Meteorological instruments, Airborne), (*Moisture, Measurement), Calibration, Handling, Atmospheric condensation, Clouds, Fog.

The report describes two instruments that have been designed and fabricated for use in measuring various meteorological parameters in the atmosphere surrounding, and inside, clouds and fog. These instruments are an airborne raindrop spectrometer that will measure the size and distribution of raindrops at various flight altitudes and an automatic liquid-water-content meter that will measure continuously the liquid-water content of clouds and fog while unattended. (Author)
AD-646 661 HC$3.00 MF$0.65

ADDITION OF SIGNAL CONDITIONING AND DATA PROCESSING CAPABILITY TO THE UNATTENDED METEOR TRAIL WIND AND DENSITY SET.
Indatacon Corp., Bolton, Mass.
For primary bibliographic entry see Field 17I.
AD-646 668 HC$3.00 MF$0.65

A TABULAR PRESENTATION OF THE SURFACE BOUNDARY LAYER MODELS OF WEBB, BUSINGER, AND PANOFSKY.
Data rept.,
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
Frank V. Hansen. Jan 67, 151p
ECOM-5104

Descriptors: (*Boundary layer, *Atmospheric motion), Wind, Atmospheric temperature, Tables, Stability, Numerical analysis, Surfaces.

Three hypotheses for a diabatic surface boundary layer were examined (as a function of the gradient Richardson number) by numerical integration methods. The models are presented in tabular form in terms of diabatic wind influence function, the gradient stability ratio and a universal function that corrects for thermal stratification in unstable air. (Author)
AD-646 700 HC$3.00 MF$0.65

A SEMI-OBJECTIVE METHOD FOR PREDICTING THE OCCURRENCE OF RADIATION-ADVECTION FOG AT OLMSTED AFB, PA,
Weather Squadron (15), Olmsted AFB, Pa. Detachment 12.
Carl J. Smelgus. 1962, 21p

Descriptors: (*Weather forecasting, *Fog), Pennsylvania, Meteorological parameters, Wind, Dew point, Visibility.

Favorable results were obtained in predicting the occurrence of radiation-advection fog which reduces the visibility to less than 3-miles the following morning. The parameters investigated were the gradient wind direction and the dewpoint depression during certain periods in the afternoon and evening. (Author)
AD-646 727 HC$3.00 MF$0.65

WEATHER INFORMATION REMOTING AND DISPLAY SYSTEM.
Westinghouse Electric Corp., Baltimore, Md.
For primary bibliographic entry see Field 17B.
AD-646 766 HC$3.00 MF$0.65

SURFACE EVALUATION AND DEFINITION (SUEDE) PROGRAM.
Electro-Optical Systems, Inc., Pasadena, Calif.
For primary bibliographic entry see Field 8C.
AD-646 828 HC$3.00 MF$0.65

OROGRAPHIC EFFECTS ON PRECIPITATION PROCESSES.
Interim rept. no. 3, 15 Sep 65-14 Mar 66,
Oregon State Univ., Corvallis.
Laurence D. Mendenhall. Jan 67, 33p
ECOM-03712-3
Contract DA-36-039-AMC-03712 (E)
See also AD-642 733.

Descriptors: (*Atmospheric precipitation, *Meteorological radar), Mountains, Rainfall, Clouds, Backscattering, Radar signals, Instrumentation, Radar pulses, Data processing systems, Particles, Radar reflections.
Identifiers: Orographic precipitation.

New techniques for sampling, recording and analyzing the signal backscattered from precipitation and non-precipitation targets are briefly described. These techniques employ rather recently developed instrumentation, some of which apparently have not been used heretofore for pulse-to-pulse studies, thus overcoming many of the limitations imposed on similar previous studies by the state of the art in sampling, recording and analysis. Examples are given of some measurements of the amplitude of consecutive backscattered radar pulses obtained by sampling the video with a range delayed, gated amplifier (a standard oscilloscope accessory) and recording the sampled video on an analog magnetic tape recorder. Digitizing of the analog tape prepares the data for subsequent analysis by a digital computer. A review of the literature on the subject of the fluctuating echo from precipitation reveals that the previous investigations emphasized primarily the relationship between the fluctuation statistics and the motions of the particles. The present study suggests that other factors intimately related to the precipitation process may contribute significantly to the observed fluctuations, namely the collision and breakup of the particles. (Author)
AD-646 894 HC$3.00 MF$0.65

CBE FACTORS: MONTHLY SURVEY NO. 12.
Aerospace Technology Div., Library of Congress, Washington, D. C.
For primary bibliographic entry see Field 15B.
AD-646 899 HC$3.00 MF$0.65

ACHIEVEMENTS OF SCIENCE - GEOPHYSICS, 1962.
Israel Program for Scientific Translations, Ltd., Jerusalem.
For primary bibliographic entry see Field 8K.
For abstract, see STAR 05 06.
N67-15421 HC$3.00 MF$0.65

OPTICAL INSTABILITY OF THE EARTH'S ATMOSPHERE.
Israel Program for Scientific Translations, Ltd., Jerusalem.
N. I. Kucherov. 1966, 179p NASA-TT-F-437.

TT-67-51372
Transl. Into English Of The Book "opticheskaya Neustoichivost' Zemnoi Atmosfery" Moscow, Izd. Nauka, 1965 Published For Nasa And Nsf

Descriptors: *Astronomical observatory, *Astronomical telescope, *Atmospheric turbulence, *Conference, *Optical image, *Refractive index, *Star tracking, *Stellar luminosity, *U.S.S.R., Air, Astronomical, Atmospheric, Climate, Difference, Disturbance, Evaluation, Geoastrophysics, Image, Index, Instability, Layer, Limb, Luminosity, Lunar, Observation, Observatory, Optical, Oscillation, Perturbation, Photography, Pulse, Refraction, Scintillation, Site, Star, Stellar, Telescope, Topography, Tracking, Turbulence, Visibility.

For abstract, see STAR 05 06.
N67-15461 HC$3.00 MF$0.65

VARIABILITY OF SOUND PROPAGATION PREDICTION DUE TO ATMOSPHERIC VARIABILITY FINAL REPORT.
Kaman Aircraft Corp., Colorado Springs, Colo. Nuclear Div.
C. E. Buell. Jan 67, 184p NASA-CR-61160
Contract NAS8-11348

Descriptors: *Atmospheric temperature, *Meteorology, *Sound propagation, Atmospheric, Attenuation, Climatology, Humidity, Intensity, Perturbation, Prediction, Propagation, Sound, Temperature, Variable, Wind.

For abstract, see STAR 05 06.
N67-16681 HC$3.00 MF$0.65

MOVEMENT AND PREDICTABILITY OF RADAR ECHOES.
Travelers Research Center, Hartford, Conn.
For primary bibliographic entry see Field 17I.
PB-173 972 HC$3.00 MF$0.65

ANALYSIS OF VERTICAL TURBULENT FLUX BY INTEGRAL METHODS.
Scientific rept.,
Washington Univ., Seattle. Dept. of Atmospheric Sciences.
Y. Hsueh, R. G. Fleagle, and F. I. Badgley. Jan 67, 97p
Grant NSF-GP-2418

Descriptors: (*Marine meteorology, Turbulence), Transport properties, Heat transfer, Water vapor, Momentum, Integral equations, Mathematical analysis, Atmosphere, Indian Ocean.

By use of integrated mean equations, turbulent exchange of sensible heat, water vapor, and momentum between the atmosphere and the ocean may be derived from aircraft and dropsonde measurements of temperature, humidity, pressure, and wind velocity. A sequence of such measurements was made over the Indian Ocean during the winter monsoon season in the early part of 1964. Analysis shows that the determination of sensible heat exchange requires much greater accuracy in the wind measurement than does the determination of water vapor exchange, and that the determination of momentum exchange relies on the resolution with which the pressure is measured with height. Calculations of evaporation over areas several hundred kilometers on a side are compared with calculations made at a point from buoy measurements of the vertical profiles of wind velocity, humidity, and temperature. In five cases the two independent methods agree in sign and in four cases they agree in approximate magnitude. In two cases results differ in signs, these discrepancies may be traced to changes in the wind field which occurred during the flights of the observing aircraft. The possible importance of the horizontal turbulent transfer is discussed. (Author)
PB-173 990 HC$3.00 MF$0.65

TURBULENCE IN CLEAR AIR NEAR THUNDERSTORMS.
Royal Aircraft Establishment, Farnborough (England).
For primary bibliographic entry see Field 4A.
PB-173 992 HC$3.00 MF$0.65

PLAN TO DEVELOP TECHNOLOGY FOR INCREASING WATER YIELD FROM ATMOSPHERIC SOURCES.
Bureau of Reclamation, Washington, D. C. Office of Atmospheric Water Resources.
For primary bibliographic entry see Field 13B.
PB-173 994 HC$3.00 MF$0.65

MOTIONS IN THE UPPER TROPOSPHERE AS REVEALED BY SATELLITE-OBSERVED CIRRUS FORMATIONS.
Technical rept.,
National Environmental Satellite Center, Washington, D. C.
H. McClure Johnson. Oct 66, 97p NESC-39

Descriptors: (*Troposphere, Atmospheric motion), (*Meteorological satellites, Weather forecasting), (*Cirrus clouds, Photographs), Meteorological phenomena, Wind, Meteorological parameters, Marine meteorology, Tropical cyclones, Cyclones.
Identifiers: TIROS.

Cirrus formations sufficiently large and dense to be observed clearly and in detail by weather satellites, and sufficiently well organized to provide useful information on upper tropospheric flow conditions, are observed commonly by the present satellites. Such formations occur almost globally, and have been observed routinely on a near-blobal scale. These formations reveal clearly cirrus-level relative motions, which in turn often provide good estimates of upper tropospheric wind directions and useful semiquantitative estimates of upper-level speeds. These direction and speed estimates may be obtained routinely for extensive areas, including data-gap areas, and may be obtained over most major regions. The quantity and the quality of such estimates depend to a very large extent on the resolution of the satellite cameras used. They also depend significantly on the level of skill developed by the cirrus information analyst. Using high-quality satellite pictures a skilled analyst may define upper tropospheric synoptic conditions successfully and frequently over wide areas, and thus may routinely supplement and improve upper tropospheric charts as well as provide data needed for near-global machine analyses. The prospects for future improvement of these procedures appear to be very good. (Author)
PB-173 996 HC$3.00 MF$0.65

5. BEHAVIORAL AND SOCIAL SCIENCES

5A. ADMINISTRATION AND MANAGEMENT

ECONOMIC DEVELOPMENT, RESEARCH AND DEVELOPMENT, POLICY MAKING: SOME CONVERGING VIEWS.
RAND Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 5C.
AD-224 286 HC$3.00

PLANNING: A BIBLIOGRAPHY.
Technical memo.,
System Development Corp., Santa Monica, Calif.
Sheila F. Thornton. 14 Feb 64, 35p TM-1391/000/01

Descriptors: (*Bibliographies, *Research program administration), Management engineering, Commerce, Labor, Reports, Periodicals, Textbooks, Manufacturing methods, Industrial production, Federal budgets, Economics, Budgets.

The bibliography is presented on planning, encompassing long-range planning, research planning, and financial planning. It includes material on such related topics as forecasting, marketing, management and organization. Documentation includes books, reports and periodical articles divided into general subject categories. (Author)
AD-431 331 HC$3.00

PROTECTIVE STRUCTURES AND COMPONENTS: COMPILATION OF ABSTRACTS.
Rept. no. 19 on ATD work assignment no. 13.
Library of Congress, Washington, D. C. Aerospace Technology Div.
1 Nov 66, 35p ATD-66-132
TT-67-60775
Based on Soviet and Satellite open sources pub. 1966. Rept. on Surveys of Foreign Scientific and Technical Literature. See also AD-632 990.

Descriptors: (*Structures, Abstracts), (*Transportation, Abstracts), (*Launching sites, Abstracts), (*Packaging, Abstracts), Preservation, Storage, Petroleum, Permafrost, Construction, Pipes, Roads, Railroads, Hoists, Protection, Bibliographies.

Contents: Facilities; Transportation; Launch site; Packaging, preservation, and storage. The report includes data concerning the storage of petroleum products in permafrost; the equipment and machines used on construction of roads and earthworks in permafrost and frozen soils; the laying of pipeline: in permafrost areas; the electric warming of frozen soil; new gas and oil pipelines; new roads and railways; road, railroad, and water vehicle transportation; crawler cranes; and the development of containerized and packaged shipments in volume and techniques. (Author)
AD-646 390 HC$3.00 MF$0.65

PROGRAM PLANNING FOR RESEARCH AND DEVELOPMENT IN THE NAVY,
Syracuse Univ., Washington, D. C. Washington Research Office.
Herbert H. Rosenberg, and Henry M. Bain, Jr.
Jan 64, 305p
Contract N6onr-248 (07)

Descriptors: (*Naval research, *Management planning), (*Research program administration, Naval research), Navy budgets, Navy.

The report describes several but by no means all phases of the program planning process for research and development in the Department of the Navy. Nor are the chapters restricted in content to the Navy as we know it today. Chapter II, for example, dwells on the historical evolution of both research and development and systematic program planning in the Department. Chapter VII views the Navy's relations with Congress on research and development budget matters. And Chapter III suggests an approach to a general theory of the program planning process. Nevertheless, all of the chapters relate directly to the programming of research and development as it occurs in the Navy. (Author)
AD-646 497 HC$3.00 MF$0.65

AN APPROACH TO DEFINING POSTATTACK RECOVERY MANAGEMENT CONCEPTS AND TECHNIQUES,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 15C.
AD-646 627 HC$3.00 MF$0.65

FOREIGN SCIENCE BULLETIN VOL. 3, NO. 1, 1967.
Library of Congress, Washington, D. C. Aerospace Technology Div.
Jan 67, 64p
TT-67-60870
A Monthly Review of Selected Foreign Scientific and Technical Literature. Also available on subscription, $36.00/yr. See also AD-646 014.

Descriptors: (*Scientific research, Reviews), (*Microwave equipment, *Avalanche diodes), (*Lasers, *Chelate compounds), (*Moon, Optical properties), (*Bionics, Simulation), (*Semiconductors, Organic materials), Diodes (Semiconductor), Rareearth compounds, Lunar probes, Infrared radiation, X rays, Cybernetics, Photoconductivity, Scientific personnel, Symposia, Radiobiology, Masers, Ships, Wind, Elasticity, Plasticity.

Contents. Full length reviews: Microwave elements based on avalanche - transit diodes: Rareearth element chelates as active laser materials. Science and technology notes: Study of lunar radiation in the infrared and visible bands by the Luna-10 satellite: Study of lunar x-ray radiation by the Luna-10 satellite: First attempts to simulate human behavior: Living systems and the principles of stability and autoregulation: Photoconduction in certain liquid organic semiconductors. Conferences: Meeting of the Department of Mathematics, Mechanics, and Cybernetics of the Ukrainian Academy of Sciences. Science personalities: Victor Sergeyevich Kulebakin. Book reviews: Biological Effects of Microwaves: Masers and Lasers - Poland: Fishing Fleet - CEMA Conference Proceedings: Local Winds - Central Asia: Mechanics - Elasticity and Plasticity.
AD-646 634 HC$3.00 MF$0.65

A CHANCE-CONSTRAINED APPROACH TO CAPITAL BUDGETING WITH PORTFOLIO TYPE PAYBACK AND LIQUIDITY CONSTRAINTS AND HORIZON POSTURE CONTROLS.
Carnegie Inst. of Tech., Pittsburgh, Pa. Management Sciences Research Group.
For primary bibliographic entry see Field 5C.
AD-646 723 HC$3.00 MF$0.65

MASTERS THESES IN THE PURE AND APPLIED SCIENCES--1963. VOLUME VIII.
Final rept.,
Purdue Univ., Lafayette, Ind. Thermophysical Properties Research Center.
Beth M. Schick. Aug 66, 147p
AFOSR-67-0302
Contract AF 49 (638)-1371
See also AD-646 756.
Availability: Hard copy available from Thermophysical Properties Research Center, Purdue Univ., 2595 Yeager Road West Lafayette, Ind. $6.00.

Descriptors: (*Scientific research, Bibliographies), Theses, Engineering, Astronomy, Chemistry, Communication systems, Physics, Fuels, Geology, Minerals, Irrigation systems, Metallurgy, Meteorology, Oceanology, Petroleum, Photogrammetry, Plastics, Paper, Nuclear reactors, Textiles, Transportation, Universities.

The report is the outgrowth of research conducted at Purdue University on machine processing techniques for reference text preparation. The format of the report uses computer processing techniques developed in the course of the research effort. The titles, authors, and dates of Master-level theses are listed by discipline, and by university within each discipline. The disciplines included are in the pure and applied sciences with the exclusion of Mathematical and Life Sciences-175 colleges and universities contributed to the publication. (Author)
AD-646 742 Not available from CFSTI.

MASTERS THESES IN THE PURE AND APPLIED SCIENCES - 1962 ACCEPTED BY COLLEGES AND UNIVERSITIES OF THE UNITED STATES. VOLUME VII.
Final rept.,
Purdue Univ., Lafayette, Ind. Thermophysical Properties Research Center.
Beth M. Schick. Aug 66, 138p
AFOSR-67-0363
Contract AF 49 (638)-1371
See also AD-646 791.
Available from Thermophysical Properties Research Center, Purdue University, 2595 Yeager Rd., West LaFayette, Indiana. HC/$6.00.

Descriptors: (*Scientific research, Bibliographies), Theses, Engineering, Astronomy, Chemistry, Communication systems, Geology, Physics, Irrigation systems, Minerals, Metallurgy, Meteorology, Oceanology, Petroleum, Photogrammetry, Paper, Textiles, Transportation, Universities.

The report is the outgrowth of research conducted at Purdue University on machine processing techniques for reference text preparation. The format of the report uses computer processing techniques developed in the course of the research effort. The titles, authors, and dates of Master-level theses are listed by discipline, and by university within each discipline. The disciplines included are in the pure and applied sciences with the exclusion of Mathematical and Life Sciences-186 colleges and universities contributed to this publication. (Author)
AD-646 756 MF$0.65

MASTERS THESES IN THE PURE AND APPLIED SCIENCES - 1961 ACCEPTED BY COLLEGES AND UNIVERSITIES OF THE UNITED STATES. VOLUME VI.
Final rept.,
Purdue Univ., Lafayette, Ind. Thermophysical Properties Research Center.
Beth M. Schick. Aug 66, 131p
AFOSR-67-0364
Contract AF 49 (638)-1371
See also AD-646 756.
Available from Thermophysical Properties Research Center, Purdue University, 2595 Yeager Rd., West LaFayette, Indiana. HC/$6.00.

Descriptors: (*Scientific research, Bibliographies), Theses, Engineering, Astronomy, Chemistry, Communication systems, Fuels, Geology, Physics, Minerals, Metallurgy, Meteorology, Oceanology, Petroleum, Plastics, Paper, Textiles, Photogrammetry, Geodesics, Universities.

The report is the outgrowth of research conducted at Purdue University on machine processing techniques for reference text preparation. The format of the report uses computer processing techniques developed in the course of the research effort. The titles, authors, and dates of Master-level theses are listed by discipline, and by university within each discipline. The disciplines included are in the pure and applied sciences with the exclusion of Mathematical and Life Sciences-186 colleges and universities contributed to this publication. (Author)
AD-646 791 MF$0.65

A BIOGRAPHICAL INFORMATION RETRIEVAL PROGRAM,
Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
C. Keith Robbins. 1966, 22p

Descriptors: (*Personnel management, *Information retrieval), Professional personnel, Engineering personnel, Data storage systems, Design, Programming (Computers), Manpower.

The report discusses the design of an experimental information retrieval program to provide rapid access to detailed biographical information on laboratory personnel. The continued operation of such a system, it is hoped, will significantly decrease the administrative workload of the laboratory engineering personnel and additionally will provide more accurate and timely answers to higher echelon inquiries. Sample information output formats are included. (Author)
AD-646 845 HC$3.00 MF$0.65

INCEPTION, DESIGN AND IMPLEMENTATION OF A MANAGEMENT INFORMATION SYSTEM.
Master's thesis,
American Univ., Washington, D. C.
David Alfred Lewis. Jun 67, 54p

Descriptors: (*Management control systems, Systems engineering), (*Decision making, Management planning), Information retrieval, Data processing systems, Data storage systems, Operations research, Feedback, Management engineering.

The purpose of this paper is to develop a uniform systematic approach to the design and implementation of a management information system. In recent years there has been published reams of literature about various aspects of management information systems, and, some specific design considerations of these systems. However, nowhere during the course of this author's research could there be found a comprehensive guide or instructive document directed towards the design of a management information system. To this end - the creaction of such a document - is this paper dedicated. The procedures developed in this paper are, as most similar procedures in general, designed to guide the manager and analyst through all phases from initial inception to successful implementation of a management information system. Many factors must be considered while applying this procedure, e.g., complexity and scope of the information system. These factors are discussed throughout this paper in terms of their impact on each phase of the design process.
AD-646 851 HC$3.00 MF$0.65

AIR FORCE ADP EXPERIENCE HANDBOOK (PILOT VERSION).
Planning Research Corp., Los Angeles, Calif. Information Systems Div.
For primary bibliographic entry see Field 9B.
AD-646 863 HC$3.00 MF$0.65

PRIMER FOR AIR FORCE ADP EXPERIENCE HANDBOOK (PILOT VERSION).
Planning Research Corp., Los Angeles, Calif. Information Systems Div.
For primary bibliographic entry see Field 9B.
AD-646 866 HC$3.00 MF$0.65

ON USE OF AIR FORCE ADP EXPERIENCE TO ASSIST AIR FORCE ADP MANAGEMENT. VOLUME I. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS.
Planning Research Corp., Los Angeles, Calif. Information Systems Div.
For primary bibliographic entry see Field 9B.
AD-646 867 HC$3.00 MF$0.65

ON USE OF AIR FORCE ADP EXPERIENCE TO ASSIST AIR FORCE ADP MANAGEMENT. VOLUME III. CONCEPT AND PLAN.
Planning Research Corp., Los Angeles, Calif. Information Systems Div.
For primary bibliographic entry see Field 9B.
AD-646 868 HC$3.00 MF$0.65

ON USE OF AIR FORCE ADP EXPERIENCE TO ASSIST AIR FORCE ADP MANAGEMENT. VOLUME II. ACTIVITIES.

Planning Research Corp., Los Angeles, Calif. Information Systems Div.
For primary bibliographic entry see Field 9B.
AD-646 870 HC$3.00 MF$0.65

LP II: A GOAL PROGRAMMING MODEL FOR MEDIA PLANNING.
Research rept.,
Carnegie Inst. of Tech., Pittsburgh, Pa. Management Sciences Research Group.
A. Charnes, W. W. Cooper, J. K. DeVoe, D. B. Learner, and W. Reinecke. 11 Jan 67. 18p RR-96
Contract Nonr-760(24)
Prepared in cooperation with Northwestern Univ., Evanston, Ill., under Contracts Nonr-1228 (10), DA-31-124-ARO (D)-322, Proj. NR-047-021; Cargill, Wilson and Acree, Inc.; and Batten, Barton, Durstine and Osborn, Inc.

Descriptors: (*Management planning, *Mathematical models), (*Linear programming, Management planning), Operations research, Commerce, Control.
Identifiers: Advertising.

A goal programming model for selecting media is presented which alters the objective and extends previous media models by accounting for cumulative duplicating audiences over a variety of time periods. This permits detailed control of the distribution of message frequencies directed at each of numerous marketing targets over a sequence of interrelated periods. This is accomplished via a new logarithmic non-reach device and a continuous lognormal generation of the discrete message frequencies. (Author)
AD-646 918 HC$3.00 MF$0.65

HIGHWAY RESEARCH AND DEVELOPMENT STUDIES USING FEDERAL-AID RESEARCH AND PLANNING FUNDS, FISCAL YEAR 1967 OR CALENDAR YEAR 1966, IN PROGRESS AS OF JULY 1, 1966.
Bureau of Public Roads, Washington, D. C.

Oct 66. 167p
Availability: Hardcopy available from Superintendent of Documents, GPO, Washington, D. C., 20402 $1.00.

Descriptors: (*Roads, Federal budgets), (*Research program administration, Roads), United States government, Costs, Scientific research, Management planning, Transportation, Urban areas, Traffic, Materials, Safety, Control systems, Structural properties, Maintenance.

The research and development studies reported in this pamphlet are those financed wholly or in part with Federal-aid funds conducted by the State highway departments with their own forces or by other organizations for the department which were in progress as of July 1, 1966. The estimated cost of each of the studies is the amount approved by the Office of Research and Development in the most current work program for a particular State including subsequent modifications to July 1, 1966. Also included is a listing of the active projects as of July 1, 1966 for the AASHO National Cooperative Highway Research Program (NCHRP). These projects are sponsored by the American Association of State Highway Officials in corporation with the Bureau of Public Roads and are administered by the National Academy of Sciences through the Highway Research Board. They are financed with a pool of funds consisting of five percent of the one and one-half percent Federal-aid funds of the participating State highway department. The studies are categorized in different groupings to permit either a macroscopic analysis in the eight broad areas or a microscopic analysis of each study in detail. The pamphlet contains a general summary of the studies by broad areas, a listing of the individual studies by States and a detailed description of the objective, and conducting agency and funding for each study. (Author)
PB-173 988 HC$1.00 MF$0.65

EVALUATION OF IDENTIFICATION FACTORS,
New Hampshire Univ., Durham.
Shan S. Kuo. 1966. 61p Rept. no. 0590
Contract CPR-11-0754
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Motor vehicle operators, Records), Identification, Data storage systems, Statistical data, Information retrieval, Digital computers, Reliability, Data processing systems, Programming (Computers), Factor analysis.

The report covers a study of the relative values of identification factors currently being used in vehicle driver record agencies throughout the United States. The factors were evaluated with respect to their discriminatory capacity in readily ascertaining that a pair of records match each other. The studies utilized electronic digital computers to process the very large number of driver records used. The most reliable combinations of these factors in obtaining record matches was identified. (Author)
PB-174 009 HC$3.00 MF$0.65

EVALUATION OF STATE PROGRAMS FOR RADIATION CONTROL.
Southern Interstate Nuclear Board, Atlanta, Ga.
For primary bibliographic entry see Field 6R.
PB-174 050 HC$3.00 MF$0.65

5B. DOCUMENTATION AND INFORMATION TECHNOLOGY

LIST OF LIBRARY ACCESSIONS.
Federal Fire Council, Washington, D. C.
For primary bibliographic entry see Field 13L.
AD-646 500 HC$3.00 MF$0.65

FOREST PRODUCTS LABORATORY LIST OF PUBLICATIONS ON SANDWICH CONSTRUCTION.
Forest Products Lab., Madison, Wis.
For primary bibliographic entry see Field 13M.
AD-646 569 HC$3.00 MF$0.65

FOREST PRODUCTS LABORATORY LIST OF PUBLICATIONS ON MODIFIED WOODS, PAPER-BASE LAMINATES, AND REINFORCED PLASTIC LAMINATES.
Forest Products Lab., Madison, Wis.
For primary bibliographic entry see Field 11I.
AD-646 570 HC$3.00 MF$0.65

ECONOMICS DEPARTMENT PUBLICATIONS, 1963-1966: AN AUTHOR INDEX OF THE OPEN LITERATURE, WITH ABSTRACTS,
RAND Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 5C.
AD-646 622 HC$3.00 MF$0.65

MASTERS THESES IN THE PURE AND APPLIED SCIENCES--1963. VOLUME VIII.
Purdue Univ., Lafayette, Ind. Thermophysical Properties Research Center.
For primary bibliographic entry see Field 5A.
AD-646 742 Not available from CFSTI.

MASTERS THESES IN THE PURE AND APPLIED SCIENCES - 1962 ACCEPTED BY COLLEGES AND UNIVERSITIES OF THE UNITED STATES. VOLUME VII.
Purdue Univ., Lafayette, Ind. Thermophysical Properties Research Center.
For primary bibliographic entry see Field 5A.
AD-646 756 MF$0.65

MASTERS THESES IN THE PURE AND APPLIED SCIENCES - 1961 ACCEPTED BY COLLEGES AND UNIVERSITIES OF THE UNITED STATES. VOLUME VI.
Purdue Univ., Lafayette, Ind. Thermophysical Properties Research Center.
For primary bibliographic entry see Field 5A.
AD-646 791 MF$0.65

A BIOGRAPHICAL INFORMATION RETRIEVAL PROGRAM,
Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 5A.
AD-646 845 HC$3.00 MF$0.65

INCEPTION, DESIGN AND IMPLEMENTATION OF A MANAGEMENT INFORMATION SYSTEM.
American Univ., Washington, D. C.
For primary bibliographic entry see Field 5A.
AD-646 851 HC$3.00 MF$0.65

USER SURVEY OF NAVY TECHNICAL REPORTS,
East Coast Navy Interlaboratory Committee on Editing and Publishing.
A. T. Drury. 1 May 66. 15p ILCEP-East Monograph-3
Supported in part by David Taylor Model Basin, Washington, D. C. Technical Information Div.

Descriptors: (*Information retrieval, *Scientific research), (*Naval research, Reports), Engineering personnel, Scientific personnel, Attitudes, Documentation, Libraries, Periodicals, Technical information centers, Acceptability, Questionnaires.

A survey of 129 scientists and engineers in 4 Navy R and D activities was conducted to determine what use these research personnel make of libraries, journal articles or other sources of technical information. The findings show that most of the research men make little use of libraries, preferring to obtain information through references or citations which appear in technical reports.
AD-646 893 HC$3.00 MF$0.65

BIBLIOGRAPHY, SUBJECT INDEX, AND AUTHOR INDEX OF THE LITERATURE EXAMINED BY THE RADIATION SHIELDING INFORMATION CENTER,
Oak Ridge National Lab., Tenn. Radiation Shielding Information Center.
For primary bibliographic entry see Field 18F.
ORNL-RSIC-5-Rev-1 HC$3.00 MF$0.65

MANAGEMENT OF CONTRACTOR DATA AND REPORTS. VOLUME II: AUTHORIZED DATA LIST.
Joint AFSC/AFLC manual.
Air Force Systems Command, Washington, D. C. 5 Feb 67. 180p AFSCM-310-1G-VOL-2 AFLCM-310-1G-VOL-2
Prepared in cooperation with Air Force Logistics Command, Wright-Patterson AFB, Ohio. Supersedes AFSC/AFLC IC 11, 29 August 1966. See also PB-172 870-A thru F, and PB-172 869.

Descriptors: (*Data, Processing), (*Reports, Processing), Management control systems, Specifications, Military requirements, Instruction manuals.
Identifiers: Contractors.

The report contains specifications for completing AFLC/AFSC Form 9 (Data Item). Form 9 con-

tains information concerning Air Force research reports.
PB-172 870-G HC$3.00

PROGRESS OF THE UNITED STATES GOVERNMENT IN SCIENTIFIC AND TECHNICAL COMMUNICATIONS 1965.
Federal Council for Science and Technology, Washington, D. C. Committee on Scientific and Technical Information.
1965, 48p

Descriptors: (*Documentation, Scientific research), (*United States Government, *Technical information centers), Information retrieval, Classification, Personnel, Organizations, Standardization, Periodicals, Training.
Identifiers: COSATI.

The report discusses progress achieved by the Federal Government in improving the information resources and processes required to support a vigorous and expanding national science and technology. It presents a comprehensive view, not only of how COSATI conducted its activities, the problems it considered and tackled, but also the results of joint and separate actions of the Federal agencies. The report attempts to map the present state of affairs, with the hope that it may serve as a springboard toward productive future actions. (Author)
PB-173 510 HC$3.00 MF$0.65

PARTIAL BIBLIOGRAPHY ON SUBJECTS RELATED TO ACTIVE VIBRATION ISOLATION AND ACTIVE VEHICLE SUSPENSIONS,
Massachusetts Inst. of Tech., Cambridge. Engineering Projects Lab.
For primary bibliographic entry see Field 13F.
PB-173 649 HC$3.00 MF$0.65

A PATENT COPY DOCUMENT SYSTEM FOR THE STORAGE, RETRIEVAL, DUPLICATION AND DISPLAY OF U. S. PATENTS,
Patent Office, Washington, D. C.
Peter F. Urbach, George A. Chadwick, and Ethan A. Hurd. Nov 65, 129p

Descriptors: (*Patents, Documentation), Information retrieval, Storage, Costs, Operation, Maintenance, Flow charting, Printing, Systems engineering, Classification, United States Government.

A detailed analysis of the operation and costs of the Patent Office's Patent Copy Dissemination System is presented, including flowcharts on present system operation and costs. The costs of file maintenance, document reproduction and document dissemination activities are analyzed. Preliminary mechanization of the existing patent copy sales system is described and requirements for a more advanced system are given. Patent examiner search and display requirements are also analyzed. This report was a portion of the bid set for the modernization of the Patent Office's Patent Copy Document System distributed in November 1965. (Auther)
PB-173 989 HC$3.00 MF$0.65

REPORT ON A LIBRARY AUTOMATION PROJECT.
Rept. for 1963-1965,
Illinois Univ., Urbana.
Robert D. Kozlow. 1966, 765p
Grants NSF-GN-77, NSF-GP-302

Descriptors: (*Libraries, Automation), (*Information retrieval, Libraries), Universities, Data processing systems, Documentation, Instruction manuals, Computer programs, Flow charting, Programming (Computers).

It is important that the librarian be the one to translate these new techniques into the language of the library and that this job not be left in the hands of computer personnel. It is easier to train a librarian in the techniques of programming than it is to make a librarian out of a physicist or mathematician trained in computer and machine technology. Being a librarian implies a state of mind as well as special training. It is only by being in charge that the librarian will be able to insist on arranging and handling bibliographic information in a manner convenient and easy for the patron to use, and meeting the basic objectives of the library and the predominance of a service-centered philosophy.
PB-173 995 HC$3.00 MF$0.65

EVALUATION OF IDENTIFICATION FACTORS,
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 5A.
PB-174 009 HC$3.00 MF$0.65

EXPERIMENTAL STUDIES OF RELEVANCE JUDGEMENTS: THIRD PROGRESS REPORT.
Technical memo.
System Development Corp., Santa Monica, Calif.
20 Jan 67, 69p TM-3347
Contract NSF-C-424
See also PB-172 897.

Descriptors: (*Decision making, Analysis of variance), (*Information retrieval, Decision making), Psychometrics, Factor analysis, Classification.
Identifiers: Relevance (Documentation).

Progress is reported on work to develop empirical information on human relevance judgments. The report describes the origins and rationale of the project, briefly summarizes previously reported project work, and provides detailed descriptions on three completed studies and four other studies still in progress. Results from the study of stylistic features of articles show that value judgments about stylistic features are not clearly separated from judgments of relevance and, surprisingly, that the degree of contamination is partly a function of particular subject matter judged. Results from a study of different types of relevance rating scales show that the commonly used category scale, which had previously been shown to be superior to ranking techniques, also outperforms magnitude-ratio scales as presently used. Finally, the study of informal post-experimental questionning and probing proves these to be valuable procedures, particularly when used in conjunction with controlled experiments. (Author)
PB-174 082 HC$3.00 MF$0.65

BIOLOGICAL EFFECTS OF IONIZING RADIATION. AN ANNOTATED BIBLIOGRAPHY COVERING THE YEARS 1898-1957,
Rochester Univ., N. Y. Atomic Energy Project.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 04.
TID-3097 (Abstract) HC$3.00 MF$0.65

BIOLOGICAL EFFECTS OF IONIZING RADIATION, AN ANNOTATED BIBLIOGRAPHY COVERING THE YEARS 1898-1957,
Rochester Univ., N. Y. Atomic Energy Project.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 04.
TID-3097 (Index) HC$3.00 MF$0.65

PLOWSHARE A SELECTED, ANNOTATED BIBLIOGRAPHY OF THE CIVIL, INDUSTRIAL, AND SCIENTIFIC USES FOR NUCLEAR EXPLOSIVES,
Division of Peaceful Nuclear Explosives (AEC), Washington, D. C.
Carl R. Gerber, and Hugh E. Voress. May 66, 108p
Prepared in cooperation with Division of Technical Information Extension (AEC) Oak Ridge, Tenn.

Descriptors: (*Nuclear explosions, Bibliographies), (*Nuclear industrial applications, Nuclear explosions).

For abstract, see NSA 21 04.
TID-3522 HC$3.00 MF$0.65

5C. ECONOMICS

ECONOMIC DEVELOPMENT, RESEARCH AND DEVELOPMENT, POLICY MAKING: SOME CONVERGING VIEWS,
RAND Corp., Santa Monica, Calif.
Albert O. Hirschman, and Charles E. Lindblom.
4 May 60, 30p P-1982
Prepared in cooperation with Columbia Univ., and Yale Univ.

Descriptors: (*Economics, *Decision making), Problem solving, Scientific research, Management engineering.

The convergence examined is between the views of Hirschman on economic development, Burton Klein and William Meckling on technological research and development, and Lindblom on policy making in general. These three independent lines of work appear to challenge in remarkably similar ways some widely accepted generalizations about what is variously described in the literature as the process of problem solving and decision making. (Author)
AD-224 286 HC$3.00

SECULAR EQUALIZATION AND CYCLICAL BEHAVIOR OF INCOME DISTRIBUTION,
RAND Corp., Santa Monica, Calif.
T. Paul Schultz. Dec 66, 34p P-3519
Research supported in part by Ford Foundation and Harvard Univ.

Descriptors: (*Wages, Distribution), Netherlands, United States, Economics, Money, Labor, Distribution functions.

A purpose of the investigation is to suggest an aggregate model that incorporates short-run factors that displace the distribution of income from the long run equilibrium trend. Annual personal income data for the Netherlands are employed in verifying the structure, estimating the parameters and testing the hypotheses implicit in the proposed model. The following conclusions emerge from the study: (1) income inequality has not only decreased in the Netherlands during the last fifty years, but the secular decline substantially exceeds earlier estimates; (2) this secular equalization of incomes appears to stem from the increased labor share of income and its more equal distribution; (3) the secular trend toward income equalization is greater when differences in income associated with age and sex are eliminated from recent time series; (4) cyclical changes in income inequality are important and can be statistically 'explained' in terms of aggregate disequilibrium in factor markets that induce change in price and employment levels; (5) the distributional effect of change in the price level has diminished and that of change in labor productivity has increased in the period since the Second World War. (Author)
AD-646 596 HC$3.00 MF$0.65

DAS KAPITAL: A CENTENARY APPRECIATION,
RAND Corp., Santa Monica, Calif.
Evsey D. Domar. 29 Dec 66, 5p P-3514
Prepared for presentation at American Economic Association meeting in San Francisco, December 29, 1966.

Descriptors: (*Economics, Theory), Communism, Reviews, History, Symposia.
Identifiers: Marxism.

The author's comments are directed at papers by Bronfenbrenner and Erlich which discuss the contributions of Marx. The author views Marx as a revolutinary who attempted to build a 'scientific' foundation for the overthrow of capitalism.
AD-646 597 HC$3.00 MF$0.65

ECONOMICS DEPARTMENT PUBLICATIONS, 1963-1966: AN AUTHOR INDEX OF THE OPEN LITERATURE, WITH ABSTRACTS.
RAND Corp., Santa Monica, Calif.
Harriett Porch. Jan 67, 75p RM-2800-2-Suppl.

Descriptors: (*Economics, Bibliographies), Indexes, Abstracts, Subject indexing.

An author index is presented for RAND Economics Department publications issued between January 1, 1963 and December 31, 1966, and available in the open literature. The bibliography includes monographs (books and 'Reports'), less formal monographs or working papers ('RAND Memoranda'), and professional contributions of te journal-type ('Papers'). Short book reviews are omitted. Because this is a departmental index it excludes publications issued by other departments unless a member of the Economics Department was a co-author. (Author)
AD-646 622 HC$3.00 MF$0.65

RANDOM VARIATIONS AND SAMPLING MODELS IN PRODUCTION ECONOMICS.
RAND Corp., Santa Monica, Calif.
R. A. Levine, and R. B. Rainey. 19 Nov 58, 24p P-1552
Prepared for presentation at Econometric Soc. Meetings, 27-29 Dec 58, Chicago, Ill.

Descriptors: (*Economics, Production), (*Aircraft, *Maintenance), Operations research, Sampling, Simulation, Analysis of variance, Mathematical prediction.

The purposes of the paper are to describe a particular production function in which random phenomena play a major part (the aircraft maintenance process); to describe a simulation model used to predict the outputs of the process; and to discuss, in the light of these, the importance of random factors to the economics of production and the use of simulation models in this field of economics. The major conclusions of the paper are that random phenomena in production economics are more important than has been realized and that the random sampling method may be a useful technique for studying them. (Author)
AD-646 720 HC$3.00 MF$0.65

A CHANCE-CONSTRAINED APPROACH TO CAPITAL BUDGETING WITH PORTFOLIO TYPE PAYBACK AND LIQUIDITY CONSTRAINTS AND HORIZON POSTURE CONTROLS.
Research rept.,
Carnegie Inst. of Tech., Pittsburgh, Pa. Management Sciences Research Group.
R. Byrne, A. Charnes, W. W. Cooper, and K. Kortanek. 20 Dec 66, 33p RR-95
Contract Nonr-760 (24)
Prepared in cooperation with Northwestern Univ., Evanston, Ill. Systems Research Group, Contract Nonr-1228 (10), Proj. NR-047-021; Systems Research Memo-158 and Contract DA-31-124-ARO (D)-322; Cornell Univ., Ithaca, N. Y. Pilot Program in Environmental Systems Analysis. Presented at a Joint Meeting of the Econometric Society and American Finance Association, San Francisco, Calif., December 29, 1966.

Descriptors: (*Economics, *Probability), (*Budgets, Management planning), Linear programming, Money, Optimization, Decision making.
Identifiers: Investment returns.

Ideas from Chance-Constrained (C2) Programming and Linear Programming under uncertainty (LPUU) are combined as part of an exploration in approaches to capital budgeting under risk which are likely to be more operational than those which are available in the form of a supposed prior characterization via utility functions, etc. Two types of risk are considered via payback and liquidity constraints which are designed to handle, respectively, economic risks in the sense of lost opportunity risks as well as accounting risks in the sense of actually realized loss possibilities. The concept of an 'horizon posture' is also introduced and elaborated via normal (and related) distributions and the zero-order rules of C2 programming. (Author)
AD-646 723 HC$3.00 MF$0.65

LP II: A GOAL PROGRAMMING MODEL FOR MEDIA PLANNING.
Carnegie Inst. of Tech., Pittsburgh, Pa. Management Sciences Research Group.
For primary bibliographic entry see Field 5A.
AD-646 918 HC$3.00 MF$0.65

TRANSIMVILLE: APPLICATION OF TRANSIM TO ANALYSIS OF THE EFFECTS OF MUNICIPAL REGULATIONS ON MOTOR CARRIER OPERATIONS.
California Univ., Los Angeles. Dept. of Engineering.
For primary bibliographic entry see Field 13F.
PB-174 021 HC$3.00 MF$0.65

A JOB DEVELOPMENT PROGRAM IN THE HOME AND APARTMENT MAINTENANCE INDUSTRY, A BUSINESS OPPORTUNITY.
Fry Consultants, Inc., Frankfurt am Main (West Germany).
For primary bibliographic entry see Field 5I.
PB-174 056 HC$3.00 MF$0.65

A STUDY OF THE FUTURE OF A MARINE TERMINAL INDUSTRY AND OF THE FEASIBILITY OF DEVELOPING NEW MARINE TERMINAL FACILITIES IN OAKLAND, CALIFORNIA. PHASE I. THE OUTLOOK FOR NEW MARINE TERMINAL FACILITIES AT THE PORT OF OAKLAND.
Daniel, Mann, Johnson, and Mendenhall, Los Angeles, Calif.
For primary bibliographic entry see Field 13J.
PB-174 058 HC$3.00 MF$0.65

A COMPREHENSIVE PLAN FOR THE DEVELOPMENT OF WHITE COUNTY, GEORGIA.
Menhinick and Little, Inc., Atlanta, Ga.
Dec 66, 158p
Contract C-160-65
Prepared in cooperation with Economic Development Administration, U. S. Dept. of Commerce, Washington, D. C.

Descriptors: (*Economics, *Georgia), History, Population, Agriculture, Natural resources, Roads, Management planning, Sanitary engineering.
Identifiers: White County, Georgia, Area redevelopment.

Contents: Early History of White County; The Population and Economy of White County; Analysis of Economic Activities; The Outlook for Growth; Natural Resources; Existing Land Use and Thoroughfares in White County; Future Land Use and Thoroughfare Plan; Community Facilities; A Critical Appraisal of Techniques; Population and Economic Data; A Zoning Resolution for White County, Georgia; Land Subdivision Resolution for White County, Georgia; Building and Electrical Codes Resolutions; A Resolution to Establish the White County Planning Commission; By-Laws of the Planning Commission.
PB-174 059 HC$3.00 MF$0.65

FEASIBILITY STUDY OF PROPOSED KEYSER VALLEY INDUSTRIAL PARK.
Bellante and Clauss, Inc., Scranton, Pa.
Oct 66, 99p
Contract C-318-65
Prepared in cooperation with Economic Development Administration Dept. of Commerce, Washington, D. C.

Descriptors: (*Industries, Feasibility studies), (*Economics, *Pennsylvania), Commerce, Labor, Employment, Urban planning, Traffic, Sanitary engineering.
Identifiers: Keyser Valley, Industrial Parks, Area redevelopment.

Based on an objective evaluation of Scranton and Lackawanna County's future growth potential, Keyser Valley Area can become an important element in continuing and enhancing the present resurgence of the region's economy. In fact, with coordinated and unified development, preferably under a single agency, Keyser Valley can become a 'city within a city', offering sites for industry, wholesaling, and heavy commercial enterprises as well as a wide range of housing types convenient to jobs, retail shops, community facilities and transportation. It is envisioned that by 1985, the Keyser Valley Area will be completely developed as a planned 'city within a city'.
PB-174 060 HC$3.00 MF$0.65

INDUSTRIAL AND ECONOMIC DEVELOPMENT IN THE WHEELING AREA.
Final rept.
Ernst and Ernst, Washington, D. C.
9 Dec 66, 118p
Contract CC-6136
Prepared in cooperation with Economic Development Administration, U. S. Dept. of Commerce, Washington, D. C.

Descriptors: (*Economics, Industrial production), (*Industrial plants, Site selection), Leadership, Labor, Employment, Commerce, Natural resources, Population, Wages, Education, Urban planning, Costs, Industries, Management planning, Construction, Transportation, Training.

The costs of doing business in the Wheeling area, and its geographic position in relation to market, materials, and manpower, indicated that the area possesses the basic economic attributes to enable it to compete with other communities for a broad range of industrial activities. Further analysis, however, indicated that the community and its development organizations were neither organized to compete effectively for new economic developments nor were they adequately taking steps to overcome problems that existing firms faced in expanding their activities.
PB-174 061 HC$3.00 MF$0.65

ECONOMIC EVALUATION OF TOURISM POTENTIALS NORTHERN NECK, VIRGINIA. VOLUME II. FEASIBILITY STUDY.
Program Research, New York.
Jan 67, 55p
Contract C-161-66
Prepared in cooperation with Economic Development Administration, Dept. of Commerce, Washington, D. C.

Descriptors: (*Recreation, Economics), (*Economics, Virginia), Museums, Costs, Seafood, Boats, Employment, Aquatic animals, Roads, Transportation, Structures, Terrain, History, Feasibility studies.

Volume I (PB-174 063 reviewed the market potentials for a greatly expanded tourist recreation business on the Northern Neck and made recommendations for a comprehensive development program. Included within the program were suggestions for specific types of accomodations and facilities. These various projects are examined in this volume in light of their economic feasibility, as individual projects and as profitable additions to the economic base of the area. A regional approach has been used in evaluating the preferred locations for the recommended development projects. The principal routes of traffic on the Northern Neck form an inverted 'Y' running in a general easterly direction toward the Chesapeake Bay. Facility developments have been proposed for the center and the three corners of the highway network.
PB-174 062 HC$3.00 MF$0.65

ECONOMIC EVALUATION OF TOURISM POTENTIALS NORTHERN NECK, VIRGINIA. VOLUME I. MARKETING STUDY.
Program Research, New York.
Jan 67, 142p
Contract C-161-66
Availability: Original document in color until exhausted. Prepared in cooperation with the Economic Development Administration, Dept. of Commerce, Washington, D. C.

Descriptors: (*Recreation, Economics), (*Economics, Virginia), Beaches, Bays, Rivers, Boats, Feasibility studies, Employment, Commerce, Forestry, Climatology, Population, Roads, Transportation.

The report is presented in two volumes. (See also PB-174 062) This volume deals with an overall marketing plan. First, a review is given of the principal assets for a tourist/recreation business and of the structure of the business as it exists today - the facilities and use patterns. Then the most likely markets for expansion are identified and defined in detail, and programs to stimulate those markets are incorporated into a comprehensive development proposal. Included in the report are a number of sketches prepared to graphically communicate the concepts for physical development that are recommended.
PB-174 063 HC$3.00 MF$0.65

BERMUDA.
International Customs Tariffs Bureau, Brussels (Belgium).
For primary bibliographic entry see Field 5D.
PB-174 065 HC$3.00 MF$0.65

BAHAMA ISLANDS.
International Customs Tariffs Bureau, Brussels (Belgium).
For primary bibliographic entry see Field 5D.
PB-174 066 HC$3.00 MF$0.65

GIBRALTAR.
International Customs Tariffs Bureau, Brussels (Belgium).
For primary bibliographic entry see Field 5D.
PB-174 067 HC$3.00 MF$0.65

FALKLAND ISLANDS.
International Customs Tariffs Bureau, Brussels (Belgium).
For primary bibliographic entry see Field 5D.
PB-174 068 HC$3.00 MF$0.65

5D. HISTORY, LAW, AND POLITICAL SCIENCE

MILITARY ASSISTANCE PROGRAMS,
RAND Corp., Santa Monica, Calif.
Charles Wolf, Jr. Oct 65, 24p P-3240
This paper has been written as a chapter for a forthcoming book, Defense Management, edited by Stephen Enke.

Descriptors: (*Foreign aid, Armed forces (Foreign)), (*Government (Foreign), Foreign aid), Economics, Foreign policy, Costs, Political science, United States government, Money, Federal budgets, Department of Defense.

As an instrument of foreign policy, military assistance involves the provision of equipment and training to the military forces of certain countries for a variety of objectives. The principal objective is to strengthen the military capabilities of recipient countries for meeting specific threats that the United States and the recipient agree are important to forestall. In addition, MAP is sometimes provided with other objectives in view: to improve the capacity of local military establishments to engage in nation-building, 'civic-action' activities that contribute to economic development; to build local facilities and installations that U. S. forces, as well as the recipient country's own forces, might use under some circumstances; and to induce a recipient country to provide base rights, or other facilities or access, desired by the U. S.
AD-474 037 HC$3.00 MF$0.65

BERMUDA.
10th ed., Year 1966-1967.
International Customs Tariffs Bureau, Brussels (Belgium).
Nov 66, 50p
Pub. as International Customs Journal Bull-98.

Descriptors: (*Law, Bermuda), (*Commerce, Law), Government (Foreign).

The journal presents the customs laws of Bermuda.
PB-174 065 HC$3.00 MF$0.65

BAHAMA ISLANDS.
5th ed., Year 1966-1967.
International Customs Tariffs Bureau, Brussels (Belgium).
Nov 66, 36p
Pub. as International Customs Journal Bull-121.

Descriptors: (*Law, Bahama Islands), (*Commerce, Law), Government (Foreign).

The journal presents the customs laws of the Bahama Islands.
PB-174 066 HC$3.00 MF$0.65

GIBRALTAR.
5th ed., Year 1966-1967.
International Customs Tariffs Bureau, Brussels (Belgium).
Nov 66, 10p
Pub. as International Customs Journal Bull-52.

Descriptors: (*Law, Great Britain), (*Commerce, Law), Government (Foreign).
Identifiers: Gibraltar.

The journal presents the customs laws of Gibraltar.
PB-174 067 HC$3.00 MF$0.65

FALKLAND ISLANDS.
5th ed., Year 1966-1967.
International Customs Tariffs Bureau, Brussels (Belgium).
Nov 66, 4p
Pub. as International Customs Journal Bull-124.

Descriptors: (*Law, Atlantic Ocean islands), (*Commerce, Law), Great Britain, Government (Foreign).
Identifiers: Falkland Islands.

The journal presents customs laws of the Falkland Islands.
PB-174 068 HC$3.00 MF$0.65

5E. HUMAN FACTORS ENGINEERING

THE METHODOLOGY OF CONTROL PANEL DESIGN.
Final rept. 1 Feb 64-30 Apr 65,
Bunker-Ramo Corp., Canoga Park, Calif. Systems Effectiveness Dept.
D. Meister, and D. E. Farr. Sep 66, 78p
AMRL-TR-66-28
Contract AF 33 (615)-1350

Descriptors: (*Control panels, Design), (*Human engineering, Control panels), Display systems, Reliability, Maintainability, Man-machine systems, Operators (Personnel), Performance (Human), Spacecraft components.

Nine control panel drawings were developed by designers using standard design criteria from a designer's guide. The drawings were then evaluated by five experts representing the disciplines of human factors, industrial design, maintainability and reliability engineering. Sample panels were mocked up and subjects were tested in operational use of these panels. The major results of the overall study were that (1) Designers manifest a high degree of variability in developing control panel drawings even when presented with a standard package of design information; (2) human engineering design criteria appear to be significant only in relation to anticipated operator performance characteristics, and difficulties in applying these criteria stem from lack of empirical knowledge of these relationships; (3) a major source of difficulty in securing the application of human engineering design criteria by designers is the latters' lack of a system-behavioral approach to design. The major need in the control panel design area is empirical research to refine and standardize simple and quickly applied evaluation techniques. More information is needed concerning the manner in which designers utilize human factors and other design inputs.
AD-646 442 HC$3.00 MF$0.65

THE ARRANGEMENT OF CIC EQUIPMENT ON A CVL. (SHIPBOARD SYSTEMS STUDIES).
Dunlap and Associates, Inc., Stamford, Conn.
For primary bibliographic entry see Field 13J.
AD-646 615 MF$0.65

HUMAN PILOT DYNAMIC RESPONSE IN SINGLE-LOOP SYSTEMS WITH COMPENSATORY AND PURSUIT DISPLAYS.
Systems Technology, Inc., Hawthorne, Calif.
For primary bibliographic entry see Field 5I.
AD-646 652 HC$3.00 MF$0.65

STUDIES OF DISPLAY SYMBOL LEGIBILITY. PART XII. THE LEGIBILITY OF ALPHANUMERIC SYMBOLS FOR DIGITALIZED TELEVISION,
Mitre Corp., Bedford, Mass.
For primary bibliographic entry see Field 5H.
AD-646 660 HC$3.00 MF$0.65

HUMAN FACTORS ENGINEERING DESIGN STANDARD FOR WHEELED VEHICLES,
Human Engineering Labs., Aberdeen Proving Ground, Md.
Robert F. Chaillet, and Alfreda R. Honigfeld. Sep 66, 187p HEL Standard S-6-66

Descriptors: (*Army equipment, Design), (*Human engineering, Army equipment), Vehicles, Standards, Environment, Ventilation, Maintenance, Control systems, Display systems, Noise, Vibration, Visibility, Colors, Vehicle chassis components, Anthropometry, Identification.

Human Engineering Laboratories standards are issued for use by the major subordinate commands of the Army Materiel Command (AMC) in the area of human factors engineering, in accordance with AMCR 70-1. HEL standards guide the AMC major subordinate commands and project managers for the inclusion of human factors engineering requirements into research and development or procurement contractual documents. HEL standards are the basis for the human factors engineering evaluations that HEL conducts in accordance with AMCR 10-4. The use of HEL standards does not obviate the need for participation by human factors specialists during research, development, test, and evaluation, because neither the areas of interest in this standard nor the contents of these areas is exhaustive.
AD-646 681 HC$3.00 MF$0.65

APERTURE SIZES AND DEPTHS OF REACH FOR ONE- AND TWO-HANDED TASKS.
Final rept. Jun 62-Nov 65,
Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
Kenneth W. Kennedy, and Byron E. Filler. Oct 66, 42p AMRL-TR-66-27

Descriptors: (*Human engineering, *Space maintenance), Machines, Design, Maintenance personnel, Spacecraft, Maintainability, Maintenance.

The report presents data on (1) the optimal sizes and locations of maintenance apertures, and (2) man's working-reach distances through such apertures, for both the shirt-sleeved and the pressure-suited conditions. In all cases, the vertical dimension of the aperture permits the technician to maintain simultaneous visual and manual contact with the task area. Data include Depth of Reach, Breadth of Aperture, Vertical Dimension of Aperture, and distances to the floor from both the lower and the upper edges of these apertures. Different apertures provide for forward or lateral reaches, in the standing or seated position, with one or both arms. Data are reported in the 5th, 25th, 50th, 75th and 95th percentiles. Ranges, Means and Standard Deviations are given. Recommendations are made regarding the appropriate application of maintenance accesses. (Author)
AD-646 716 HC$3.00 MF$0.65

A RAPID TACTICAL MINE-PLANTING SYSTEM: HOW FORCE LEVEL AFFECTS LEVER-THROWING TIME.
Human Engineering Labs., Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 19A.
AD-646 854 HC$3.00 MF$0.65

LOOKOUT ASSIST DEVICE FEASIBILITY STUDIES. VOLUME I. HUMAN FACTORS, COLLISION STATISTICS, ECONOMICS FACTORS OPERATIONS RESEARCH, SENSOR TECHNIQUES.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 090 HC$3.00 MF$0.65

LOOKOUT ASSIST DEVICE FEASIBILITY STUDIES. VOLUME II. SYSTEM RECOMMENDATIONS, (PROXIMITY AND TAU SYSTEMS), PERFORMANCE ESTIMATES, SYSTEMS PARAMETERS STUDY, A TAU CRITERION DISPLAY SYSTEM.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 091 HC$3.00 MF$0.65

LOOKOUT ASSIST DEVICE FEASIBILITY STUDIES. VOLUME III. USAGE OF SOUND AT SEA, CONNING FUNCTION STUDIES, CUE SOURCES AND THEIR VALUE, PSYCHOACOUSTICS, PHYSICAL FACTORS, WORK ACTIVITY FACTORS.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 092 HC$3.00 MF$0.65

5G. LINGUISTICS

STEPS TOWARD A MODEL OF LINGUISTIC PERFORMANCE: A PRELIMINARY SKETCH.
RAND Corp., Santa Monica, Calif.
R. M. Schwarcz. Jan 67, 41p RM-5214-PR
Contract F44620-67-C-0045

Descriptors: (*Linguistics, Models (Simulations)), Language, Information retrieval, Data storage systems, Data processing systems, Learning, Digital computers, Syntax, Semantics, Transformational grammars, Computer programs, Behavior, Performance (Human), Computational linguistics.

The report discusses the task of formulating a model of linguistic performance and proposes an approach toward this goal that is oriented toward an embodiment of the model as a digital computer program. The methodology of current linguistic theory is criticized for several of its features that render it inapplicable to a realistic model of performance, and remedies for these deficiencies are proposed. The syntactic and conceptual data structures, inference rules, generation and understanding mechanisms, and learning mechanisms proposed for the model are all described. The learning process is formulated as a series of five stages, and the roles of nonlinguistic feedback and inductive generalization relative to these stages are described. Finally, the implications of a successful performance model for linguistic theory, linguistic applications of computers, and psychological theory are discussed. (Author)
AD-646 598 HC$3.00 MF$0.65

SOME ASPECTS OF THE THEMATIC ORGANIZATION OF THE ENGLISH CLAUSE.
RAND Corp., Santa Monica, Calif.
M. A. K. Halliday. Jan 67, 28p RM-5224-PR
Contract F44620-67-C-0045

Descriptors: (*English language, *Syntax), Linguistics, Grammars, Speech.

An analysis is presented of the English clause from the point of view of its structure as a message: its thematic organization. The study is concerned with spoken English only. Recorded conversations were analyzed by rhythm, stress, and tonality, as well as by word order, to show the distinct patterns underlying a number of apparently unrelated contrasts in English grammar. The three principal systems of structuring communication are information, thematization, and identification. Each assigns a structure to the clause in terms of 'given--new' (information), 'theme--non-theme' (thematization), and 'known--unknown' (identification). Information clauses distinguish between given and new phonologically, by the tone pattern. Thematic clauses distinguish between theme and rheme (non-theme) by the sequencing of elements. Identification clauses relate a known to an unknown by stress pattern. Examination of the thematic patterns of the clause not only reveals the resources available to the speaker for the structuring of information, but can also provide further insights into the better-known aspects of English syntax. (Author)
AD-646 663 HC$3.00 MF$0.65

5H. MAN-MACHINE RELATIONS

THE METHODOLOGY OF CONTROL PANEL DESIGN.
Bunker-Ramo Corp., Canoga Park, Calif. Systems Effectiveness Dept.
For primary bibliographic entry see Field 5E.
AD-646 442 HC$3.00 MF$0.65

SELECTIVE ACCESS LASER DISPLAY BEAM POSITIONER.
Hughes Research Labs., Malibu, Calif.
For primary bibliographic entry see Field 20E.
AD-646 619 HC$3.00 MF$0.65

EFFECTS OF MANIPULATOR RESTRAINTS ON HUMAN OPERATOR PERFORMANCE.
Systems Technology, Inc., Hawthorne, Calif.
For primary bibliographic entry see Field 5I.
AD-646 653 HC$3.00 MF$0.65

STUDIES OF DISPLAY SYMBOL LEGIBILITY. PART XII. THE LEGIBILITY OF ALPHANUMERIC SYMBOLS FOR DIGITALIZED TELEVISION,
Mitre Corp., Bedford, Mass.
Glenn C. Kinney, Marion Marsetta, and Diana J. Showman. Nov 66, 44p MTR-206
ESD-TR-66-117
Contract AF 19(628)-5165
See also AD-639 750, AD-641 658.

Descriptors: (*Display systems, Human engineering), (*Symbols, Visibility), (*Television display systems, Symbols), Numbers, Visual perception, Effectiveness,
Identifiers: Legibility.

The relative legibility of numerals and capital letters in four fonts, standard Leroy, an Idealized Hazeltine, a Simulated Hazeltine and a Modified Idealized Hazeltine, was studied in three experiments using a controlled exposure time, single-symbol, recognition test. The Hazeltine fonts were constructed of TV lines digitally controlled to generate symbols of elements in a five-column by seven-row rectangular matrix. The Hazeltine font was found to be as legible as the Leroy, but losses in legibility were found for photographic simulations of the symbols as they appear on a TV tube. The modified font was found to be superior in legibility, and is recommended for display use. (Author)
AD-646 660 HC$3.00 MF$0.65

SUBROUTINES FOR IBM SYSTEM/360 TO FACILITATE VISUAL DISPLAY AND MAN-MACHINE RELATIONSHIPS.
Naval Weapons Lab., Dahlgren, Va.
For primary bibliographic entry see Field 9B.
AD-646 895 HC$3.00 MF$0.65

MODEL OF HUMAN OPERATOR RESPONSE TO STEP TRANSITIONS IN CONTROLLED ELEMENT DYNAMICS.
Systems Technology, Inc., Hawthorne, Calif.
A. V. Phatak, and D. H. Weir. Jan 67, 42p
NASA-CR-671
Contract NAS2-1868-4

Descriptors: *Dynamic model, *Human behavior, *Performance prediction, Adaptation, Behavior, Change, Control, Dynamic, Human, Model, Operator, Performance, Prediction, Psychomotor, Response, Sudden, Transition, Vehicle.

For abstract, see STAR 05 06.
N67-16011 HC$3.00 MF$0.65

A "CRITICAL" TRACKING TASK FOR MAN-MACHINE RESEARCH RELATED TO THE OPERATORS EFFECTIVE DELAY TIME. PART II - EXPERIMENTAL EFFECTS OF SYSTEM

INPUT SPECTRA, CONTROL STICK STIFFNESS, AND CONTROLLED ELEMENT ORDER.
Systems Technology, Inc., Hawthorne, Calif.
H. R. Jex, and J. D. Mc Donnell. Jan 67. 56p
NASA-CR-674
Contract NAS2-2288

Descriptors: *Adaptive control, *Compensatory tracking, *Operator performance, *Reaction time, Action, Adaptive, Behavior, Closed, Compensation, Control, Delay, Human, Loop, Measurement, Operator, Performance, Psychomotor, Reaction, Time, Tracking.

For abstract, see STAR 05 06.
N67-16012 HC$3.00 MF$0.65

TACTUAL PERCEPTION - EXPERIMENTS AND MODELS.
Stanford Research Inst., Menlo Park, Calif.
J. C. Bliss, W. R. Brody, H. D. Crane, B. Lane, and S. W. Link. Jan 67. 197p NASA-CR-623
Contracts NAS2-2752, AF 33/615/-1099

Descriptors: *Communication system, *Man-machine system, *Pattern recognition, *Sensory perception, *Spatial perception, Air, Command, Communication, Computer, Discrimination, Facility, Jet, Man-machine, Memory, Model, Neurophysiology, Pattern, Perception, Reaction, Recognition, Recovery, Response, Sensory, Spatial, Stimulus, System, Tactile, Time, Tracking, Visual.

For abstract, see STAR 05 06.
N67-16661 HC$3.00 MF$0.65

51. PERSONNEL SELECTION, TRAINING, AND EVALUATION

MISCELLANEOUS TESTS AND MINOR EVALUATIONS.
Research rept.,
Naval School of Aviation Medicine, Pensacola, Fla.
James L. Holland. 20 Apr 54. 58p Rept. nos.
NAMI-375 thru 386
NAVMED-NM001.058.251.04 thru
NM001.058.25.15

Descriptors: (*Aviation personnel, Selection), (*Naval aviation, Training), Reports, Aviation accidents, Psychometrics, Attitudes, Motivation, Adjustment (Psychology), Analysis of variance.

Contents: The Distribution of Aircraft Accidents in the Naval Aviation Training Program: A Confirmation: A Comparison of Reasons for Withdrawal Recorded by SPD Boards and to Aviation Psychologists: A Short Attitude Scale and its Relation to Motivation in the Naval Air Training Program: Opinions of Officers Regarding Assignment to the Training Command: Intolerance of Fluctuation, Manifest Rigidity and Imperceptiveness: The Discrepancy Score or the Difference Between Peer and Self-Evaluation: Readability Versus Understandability in Test Instructions: An analysis of Variance of NavCad Classes on the MCT: Psychological Characteristics of Naval Aviation Cadets as Measured by the Guilford-Zimmerman Temperament Survey: The Reliability of Peer Ratings: The Problem of the 'Undesirable' Peer Rating: The Conditions of Selection Testing in the Field.
AD-50 299 HC$3.00

THE EMPLOYMENT OF RETIRED MILITARY PERSONNEL.
Bureau of Social Science Research, Inc., Washington, D. C.
Laure M. Sharp, and Albert D. Biderman. Jul 66.
290p BSSR-371
Sponsored by Office of Manpower Policy, Evaluation and Research, Dept. of Labor, Washington, D. C.

Descriptors: (*Manpower studies, Military personnel), (*Military personnel, Retraining), Officer personnel, Employment, Transfer of training, Personnel management, Job analysis, Management engineering, Civilian personnel.

Civilian employment for men retiring from the American military service is a manpower topic that is receiving continually greater attention. Current policies tacitly assume the possibility of smooth transfers from the military to the civilian sector for a steadily growing number of physically able military retirees (an estimated 1 million by 1980). This report deals with the most comprehensive study yet undertaken of the employment transition from military to civilian life by a portion of this large reservoir of trained manpower. The primary interest here is in the intrinsic significance of the problems of this segment of the national labor force. The problems faced by men seeking civilian employment following military careers of 20 years or more, and the methods they employ in the process, may also have much relevance for the growing number of civilians who similarly need to make a change in career during the middle years. One specific objective of the study was to determine the extent to which specific occupational skills have 'high' or 'low' transferability from military to civilian occupations, and the implications of these findings for needed training and retraining programs.
AD-646 463 HC$3.00 MF$0.65

IN-FLIGHT MEASUREMENT OF HUMAN RESPONSE CHARACTERISTICS.
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
For primary bibliographic entry see Field 5J.
AD-646 493 HC$3.00 MF$0.65

TRAINING CORRECTIVE MAINTENANCE PERFORMANCE ON ELECTRONIC EQUIPMENT WITH CAI TERMINALS: I. A FEASIBILITY STUDY.
Technical rept.,
University of Southern California, Los Angeles. Dept. of Psychology.
Joseph W. Rigney. Dec 66. 41p TR-51
Contract Nonr-228 (22)

Descriptors: (*Programmed instruction, Electronic technicians), Feasibility studies, Programming languages, Computers, Tests, Learning, Performance (Human), Electronic equipment.
Identifiers: Computer-aided instruction.

A report is given of a feasibility study in which several possible relationships between student, computer terminal, and electronic equipment were considered. The simplest of these configurations was set up and examined in terms of its feasibility for teaching the performance of fault localization on a Navy transceiver. An instructional program was written in the Coursewriter language. The program guides a student through a fault localization strategy during several practice problems, providing knowledge of results and remedial instruction. It then records key student responses during the administration of test problems. Conclusions of the study are: (1) Simple CAI programming languages can be quickly learned by electronics instructors who are not trained programmers; these languages must be supplemented by more powerful languages if the full potential of CAI for performance training is to be realized. (2) Computer-guided practice in following trouble-isolation sequences can facilitate effective troubleshooting performance. Even a few hours of such practice can show interesting results. (3) There are several attractive possibilities for combining the computer terminal with electronic equipment to provide for on-line sensing of student actions on the equipment. Two major approaches emerge: console-equipment combinations to teach performance on specific equipment, and console-equipment combinations to teach generalizable skills, such as alignment procedures and bracketing logic. (Author)
AD-646 651 HC$3.00 MF$0.65

HUMAN PILOT DYNAMIC RESPONSE IN SINGLE-LOOP SYSTEMS WITH COMPENSATORY AND PURSUIT DISPLAYS.
Final technical rept.,
Systems Technology, Inc., Hawthorne, Calif.
R. J. Wasicko, D. T. McRuer, and R. E. Magdaleno.
Dec 66. 79p TR-134-4
AFFDL-TR-66-137
Contract AF 33 (657)-10835

Descriptors: (*Pilots, Performance (Human)), (*Reaction (Psychology), Pilots), Display systems, Flight control systems, Human engineering, Operators (Personnel), Motivation, Behavior, Control sticks.

The primary purpose of the experimental series reported here is to investigate, on a preliminary and exploratory basis, human operator performance differences between pursuit and compensatory displays. For each display type a wide range of forcing function bandwidths and controlled element dynamics was used. The effect of the additional information provided by separately displaying both forcing function and controlled element output (pursuit) rather than their difference (compensatory) was evaluated using the mean-squared error and a quantity called the 'effective open-loop describing function' (Y beta). As a prelude to the new data, past pursuit/compensatory tracking results are reviewed, and then a tie-in is made between these and the current series. (Author)
AD-646 652 HC$3.00 MF$0.65

EFFECTS OF MANIPULATOR RESTRAINTS ON HUMAN OPERATOR PERFORMANCE.
Final technical rept.,
Systems Technology, Inc., Hawthorne, Calif.
R. E. Magdaleno, and D. T. McRuer. Dec 66. 60p TR-134-2
AFFDL-TR-66-72
Contract AF 33 (657)-10835
Prepared in cooperation with Franklin Inst., Philadelphia, Pa. Labs. for Research and Development.

Descriptors: (*Operators (Personnel), Performance (Human)), (*Reaction (Psychology), Human engineering), Flight control systems, Pilots, Man-machine systems, Extremities, Sensory mechanisms, Neuromuscular transmission.

This report is concerned with a series of experiments in which the effects of manipulator restraints, i.e., load dynamics imposed on the operator, are central. The purposes of this investigation are to: Determine the load effects on the human operator's describing functions and performance measures for a representative variety of manipulator restraints and controlled elements. Provide inferential insight into the relative importance of limb position and output force senses in manual control.
AD-646 653 HC$3.00 MF$0.65

DEVELOPMENT AND EXPERIMENTAL EVALUATION OF AN AUTOMATED MULTI-MEDIA COURSE ON TRANSISTORS.
Final rept., Apr 65-Jun 66,
RCA Service Co., Camden, N. J.
J. H. Whitted, Jr., Edward E. Weaver, and John P. Foley, Jr. Sep 66. 114p
AMRL-TR-66-142
Contract AF 33 (615)-2880

Descriptors: (*Programmed instruction, *Transistors), Teaching machines, Education, Training devices, Solid state physics, Electronics, Automation, Transistor amplifiers, Mathematical analysis.

A completely automated multi-media self-study program for teaching a portion of electronic solid-

state fundamentals was developed. The subject matter areas included were fundamental theory of transistors, transistor amplifier fundamentals, and simple mathematical analysis of transistors including equivalent circuits, parameters, and characteristic curves. The media included a tape slide audio-visual presentations, a programmed text, a cued text, a sound movie, a workbook, an a RCA transistor trainer. A controlled experiment was conducted, comparing the effectiveness of the self-sufficient multi-media materials, with a conventional instructor/classroom presentation and existing self-study materials from Air Force Extension Course Institute. Even though the instructor/classroom subjects received somewhat higher ratio gain scores, on the average, than the multi-media subjects, this difference was not significant. Both of these modes were superior in effectiveness to the extension course materials. The principal measures of this effectiveness were a pre-test and a post-test made up of multiple choice items concerning the solid state theory covered. (Author)
AD-646 671 HC$3.00 MF$0.65

EVALUATION AND UTILIZATION STUDIES OF A NON-FLIGHT TRAINING DEVICE.
Technical rept.,
Dunlap and Associates, Inc., Stamford, Conn.
John Horwath, Corlin O. Beum, and Ralph C. Channell. 28 Feb 54. 64p
SPECDEVCEN-TR-1046-00-1
Contract Nonr-1046 (00)

Descriptors: (*Gunnery trainers, Analysis), Performance tests, Psychometrics, Standardization, Effectiveness, Errors, Training devices.
Identifiers: Evaluation.

The analysis of the scoring methods used for performance on the SAE at Little Creek and at Coronado has shown two widely differing performances when applied to the same data. The need for a standard scoring method that more adequately reflects team performance is apparent. Further investigation of the scoring procedure and of the assignment of points to components of the performance will substantially contribute to a more adequate scoring procedure. The deficiencies of the present evaluation procedure and the operation of the equipment of the SAE were presented. The results clearly indicate that the SAE in its present condition is not being utilized effectively as an evaluator. The equipment should be calibrated to eliminate errors; adequate measures of performance should be recorded; and a reliable scoring method should be developed before any conclusion can be drawn as to the effectiveness of the SAE in evaluating gunnery teams. (Author)
AD-646 708 HC$3.00 MF$0.65

AUTOMATION OF A PORTION OF NCO LEADERSHIP PREPARATION TRAINING.
Technical rept.,
George Washington Univ., Alexandria, Va. Human Resources Research Office.
Morris Showel, Elaine Taylor, and Paul D. Hood. Dec 66. 42p TR-66-21
Contract DA-44-188-ARO-2

Descriptors: (*Programmed instruction, Leadership), (*Army personnel, Leadership), (*Leadership, Training), (*Army training, Leadership), Teaching methods, Learning, Retention, Automation, Performance (Human), Training devices.

A method of presenting roughly one-seventh of the Army's two-week Leader Preparation Course (LPC) through automated instruction was developed. The automated instruction method included the use of tape-recorded lectures, supported by visual aid frames, and programed workbooks. Automated presentation proved to be at least as effective as conventional instruction in imparting the leadership knowledge covered by automation. In addition, those students who learned through the automated method appeared to retain their knowledge better than the conventionally trained students. The automated method also exhibited practicality in reduction of instructor requirements, flexibility of scheduling, and consistency of level of presentation. The automated program was adopted for use at Army Training Centers presenting the LPC. (Author)
AD-646 771 HC$3.00 MF$0.65

THE MANEUVERING TACTICS TRAINER.
Technical rept.,
International Research Associates, Inc., New York.
Eric Marder. 25 Oct 54. 174p
SPECDEVCEN-1051-00-1
Contract Nonr-1051 (00)
Report on Scoring Trainee Performance on Device 1-BZ-2.

Descriptors: (*Training devices, Performance (Human)), (*Performance (Human), Flight simulators), Maneuverability, Students, Instructors, Training films, Costs, Aviation personnel.

The project was undertaken in order to accomplish three tasks: To standardize the training of Officer Candidates on the 1-BZ-2 trainer; To install equipment for obtaining motion picture records of maneuvering on the trainer; To develop a system for scoring performance on the trainer.
AD-646 774 HC$3.00 MF$0.65

AN ANALYTICAL METHODOLOGY FOR ESTIMATING CREW COMPOSITION OF A TWO-MAN ARMY AERIAL VEHICLE.
Technical memo.,
Human Engineering Labs., Aberdeen Proving Ground, Md.
Michael A. Famiglietti, Stephen Moreland, and Joseph H. Sullivan. Jun 66. 19p TM-7-66

Descriptors: (*Flight crews, Army aircraft), (*Human engineering, Flight crews), Cost effectiveness, Aviation personnel, Psychometrics, Pilots, Display systems, Control systems, Low altitude.

This report describes a method for making course quantitative estimates of crew composition for a two-man Army aerial vehicle. It assumes that crew composition depends predominantly on the tasks men are assigned to perform. For illustration the method is applied to an aerial-vehicle concept for high-speed, low-altitude surveillance and target acquisition.
AD-646 800 HC$3.00 MF$0.65

A BIOGRAPHICAL INFORMATION RETRIEVAL PROGRAM.
Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 5A.
AD-646 845 HC$3.00 MF$0.65

EXPOSURE OF MEN TO INTERMITTENT PHOTIC STIMULATION UNDER SIMULATED IFR CONDITIONS.
Civil Aeromedical Inst., Oklahoma City, Okla.
For primary bibliographic entry see Field 6E.
AD-646 872 HC$3.00 MF$0.65

A STUDY TO DEVELOP METHODS FOR IMPROVING THE TRAINING OF CONSTRUCTION AND MATERIALS INSPECTORS.
Mississippi State Highway Dept.
For primary bibliographic entry see Field 13B.
PB-174 013 HC$3.00 MF$0.65

TRAINING MANUAL FOR INSPECTORS AND TECHNICIANS.
Mississippi State Highway Dept.
For primary bibliographic entry see Field 13B.
PB-174 014 HC$3.00 MF$0.65

A JOB DEVELOPMENT PROGRAM IN THE HOME AND APARTMENT MAINTENANCE INDUSTRY, A BUSINESS OPPORTUNITY.
Fry Consultants, Inc., Frankfurt am Main (West Germany).
Nov 66. 117p
Prepared in cooperation with Economic Development Administration, Washington, D. C.

Descriptors: (*Maintenance personnel, *Employment), (*Housing, Maintenance), Job analysis, Labor, Wages, Social psychology, Attitudes, Training, Organizations, Economics.

A test program was conducted in the Chicago labor market in order to (1) identify and create 500 new jobs in the service industry within the labor market; (2) establish a functioning organization or organizations, either private or public, for continuing the objectives of the project; and (3) create a mechanism by which the results achieved in the test area could be readily transferred to other areas of the country. In economic terms the problem is to meet the demands of consumers with the supply of available workers. In human terms, the problem is complex because 'no one wants to be a servant.' The long-range answer requires that the industry itself change (1) from an industry dominated by a direct housewife-employer/employee relationship in which the master-servant stigma is present; (2) to an industry in which the employee works for a company, receives professional training and is treated with dignity; (3) and one in which the housewife can buy reliable results from a company with a reputation at stake. (Author)
PB-174 056 HC$3.00 MF$0.65

5J. PSYCHOLOGY (INDIVIDUAL AND GROUP BEHAVIOR)

PREDICTORS OF PERFORMANCE - BEHAVIORAL AND PHYSIOLOGICAL MEASURES.
Annual progress rept. 1 Feb 65-21 Mar 66.
Washington Univ., St. Louis, Mo. Dept. of Psychiatry.
John A. Stern. 21 Mar 66. 8p
Contract DA-49-193-MD-2715

Descriptors: (*Pilots, Performance tests), Helicopters, Instrumentation, Control, Data, Magnetic tape, Data processing systems, Measurement, Behavior, Physiology, Performance (Human).
Identifiers: Manipulanda.

This report reviews our work on instrumenting a helicopter to record the output of the pilot 'manipulanda' (stick, forward-backward, left-right, throttle, collective pitch, and tail rotor control). Data is recorded on magnetic tape. Data was collected on 4 pilots, and is presently being processed in our computer center. Data reduction system at present includes a pace analog computer and a PDP-5 digital computer. (Author)
AD-479 612 HC$3.00 MF$0.65

MISCELLANEOUS TESTS AND MINOR EVALUATIONS.
Naval School of Aviation Medicine, Pensacola, Fla.
For primary bibliographic entry see Field 5I.
AD-50 299 HC$3.00

FACTORS AFFECTING INFORMATION PROCESSING IN SHORT-TERM MEMORY.
Massachusetts Univ., Amherst.
Stanley M. Moss, Joseph F. Hearns, and John B. Soward. Dec 66. 75p Rept. no. 2
Contract Nonr-3357 (06)

Descriptors: (*Recall, Visual signals), (*Memory, Performance (Human)), Information retrieval, Search theory, Motivation, Symbols, Behavior, Accuracy.

Three experiments were conducted to investigate several of the variables that affect information processing in short-term memory as reflected by the strategies used by Ss in a visual search task. The first study investigated differences in strategy as a function of method of payoff. The second study was concerned with changes in strategy when Ss shifted from one incentive ratio to another. The third study was concerned with differences in strategy when Ss were confronted with different work loads. Two general conclusions have emerged from these investigations. First, Ss strategy for optimal information processing in this task is determined by his method of payoff and his work load (Study 1 and Study 2). Second, the degree to which a strategy can be successfully implemented is limited by the interference effects of differential target value and value ratio (Study 1 and Study 2). (Author)

AD-646 373 HC$3.00 MF$0.65

GENERALIZABILITY OF GAME PLAYING SKILL.
Technical rept.,
Akron Univ., Ohio.
June DeLuca Shriver. 1966, 118p TR-3
Contract Nonr-4302 (00)

Descriptors: (*Decision making, Performance (Human)), (*Game theory, Decision making), Problem solving, Psychometrics, Intelligence tests, Personality tests, Group dynamics, Social psychology, Learning, Children.

The study attempted to discover whether (1) skill in one strategic game (The Game of 99) is generalizable to another strategic game, (Pipeline), (2) strategic skill is different from puzzle-solving skill, (3) preference for and experience in strategic games, and (4) personality factors, as measured by the Guilford-Zimmerman Temperament Survey, are related to skill in games of strategy. Twenty-four male University of Akron students (12 science majors and 12 non-science majors) participated in a round robin tournament of two games of strategy. Each was presented with a puzzle to solve. Their number of wins in each of the two games of strategy and their weighted puzzle scores were correlated with biographic, intellective, self-reported preference and experience scores, and personality factors as measured by the Guilford-Zimmerman Temperament Survey. The results seem to justify the following conclusions: (1) generalization of skill between two games which meet the operational definitions of strategic games was not demonstrated by this study, (2) there is no relationship between preference for and experience in strategic games, activities or situations and strategic skills as measured by the Game of 99 and Pipeline, and (3) no relationship was demonstrated between skill in the Game of 99 or Pipeline and personality factors as measured by the Guilford-Zimmerman Temperament Survey. (Author)

AD-646 377 HC$3.00 MF$0.65

GOALS AND INTENTIONS AS DETERMINANTS OF PERFORMANCE LEVEL, TASK CHOICE AND ATTITUDES.
Final rept., 1 Dec 65-31 Jan 67,
American Institutes for Research, Silver Spring, Md.
Edwin A. Locke, and Judith F. Bryan. Jan 67, 100p
AIR-E-51-1/67-FR
Contract Nonr-4792 (00)

Descriptors: (*Behavior, *Motivation), (*Performance (Human), *Attitudes), Reaction (Psychology), Psychometrics, Statistical analysis, Psychomotor tests.

Twenty laboratory experiments and 2 field studies were carried out to explore the relationship of goals and intentions to level of performance on tasks, task choice, and liking for, and interest in the task. The results indicated that: (1) hard goals led to a higher level of performance than easy goals and to a higher performance level than a goal of 'do your best'; (2) incentives such as knowledge of score, money, and time limits did not affect performance level independently of S's goals; (3) there was a significant relationship between behavioral intentions and choice behavior and there was no effect of monetary incentives on choice independently of S's behavioral intentions; (4) overall task liking and satisfaction with performance were positive, linear functions of the number of successes achieved on the task; further, the amount of satisfaction attained from a given success was greater when: S had expended the most effort to achieve it; when S succeeded in less time than usual; and when success followed other successes rather than a series of failures; (5) specific hard goals produced more task interest than a goal of 'do your best' (this difference was enhanced if the experiment lasted more than 2 hours); ((6) there was no relationship between task liking or interest and performance or performance improvement; both liking and performance were determined by the nature and difficulty of the individual's goal, rather than by each other. (Author)

AD-646 392 HC$3.00 MF$0.65

MEASUREMENT OF STATIC MUSCLE ENDURANCE.
Army Medical Research Lab., Fort Knox, Ky.
For primary bibliographic entry see Field 6B.
AD-646 400 Not available from CFSTI.

SURVEY OF RESEARCH ON TYPOGRAPHICAL EFFECTIVENESS.
Washington Engineering Services Co., Inc., Kensington, Md.
For primary bibliographic entry see Field 14E.
AD-646 437 HC$3.00 MF$0.65

IN-FLIGHT MEASUREMENT OF HUMAN RESPONSE CHARACTERISTICS.
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
Fred D. Newell, and Paul E. Pietrzak. 1967, 14p
Proceedings of AIAA Flight Test, Simulation and Support Conference, Cocoa Beach, Florida, February 6-8, 1967. AIAA Paper No. 67-240. Prepared in cooperation with Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.

Descriptors: (*Reaction (Psychology), Flight testing), (*Pilots, Reaction (Psychology)), Performance (Human), Transfer of training, Flight simulators, Behavior, Handling, Tracking, Computers.

This paper deals with flight programs in which data have been obtained and analyzed to define the transfer characteristics of the human pilot. The first part of the paper is a general review of previous programs and data that are documented in the literature. Some of the techniques of these past programs are described. However, more in-flight data are needed, than has been obtained in the past, to more fully define the pilot in the actual flight situation. To initiate obtaining more flight data a program has recently been done in which the Air Force variable stability T-33 was used as both a ground-based simulator and an in-flight simulator. The second part of the paper discusses this current program in which pilot transfer characteristics have been obtained for the compensatory roll tracking task. Data are presented which describe the pilot in both the ground simulator and actual flight situations.

AD-646 493 HC$3.00 MF$0.65

THE HUMAN ORIENTING REACTION AS A FUNCTION OF ELECTRODERMAL VERSUS PLETHYSMOGRAPHIC RESPONSE MODES AND SINGLE VERSUS ALTERNATING STIMULUS SERIES.
Technical rept.,
Indiana Univ., Bloomington.
John J. Furedy. Feb 67, 34p TR-17
Contract Nonr-908 (15)

Descriptors: (*Reaction (Psychology), Autonomic nervous system), (*Conditioned reflex, *Galvanic skin response), Responses, Psychophysiology, Habituation learning, Blood volume, Pulse rate, Electrophysiology.
Identifiers: Plethysmography.

Eighty Ss were presented with 300-msec. tones and lights separated by a mean interval of 45 sec. and arranged in 40-trial sequences which contained both repeated single and alternating patterns as well as trials constituting changes from these patterns. GSR and digital-blood-volume-pulse-change (VPC) were recorded. Both responses increased reliably after a stimulus change from single repetition, $p < .001$, but not after change from alternation, $F < 1$. For trials 1-15 the GSR habituated reliably and at the same rate to both repetition patterns, $p < .001$, but the VPC did not habituate to either pattern, $F < 1$. A continuous time-estimation task given to half the Ss in order to distract them from the stimuli did not affect the above results. Assuming the GSR and VPC to be components of the orienting response (OR), these findings create difficulties for OR and related theories of autonomic behavior. (Author)

AD-646 510 HC$3.00 MF$0.65

HUMAN PILOT DYNAMIC RESPONSE IN SINGLE-LOOP SYSTEMS WITH COMPENSATORY AND PURSUIT DISPLAYS.
Systems Technology, Inc., Hawthorne, Calif.
For primary bibliographic entry see Field 5I.
AD-646 652 HC$3.00 MF$0.65

EFFECTS OF MANIPULATOR RESTRAINTS ON HUMAN OPERATOR PERFORMANCE.
Systems Technology, Inc., Hawthorne, Calif.
For primary bibliographic entry see Field 5I.
AD-646 653 HC$3.00 MF$0.65

MOLECULAR NEUROCHEMISTRY OF THE HIPPOCAMPUS AND OTHER BRAIN SITES DURING CONDITIONED AVOIDANCE BEHAVIOR.
Research rept.,
York Univ., Toronto (Ontario). Molecular Psychobiology Lab.
John Gaito, James H. Davison, James Mottin, and Joanne Rigler. 5 Jan 67, 21p MPL-8
Contract Nonr-4935 (00)
See also AD-645 550, AD-645 551.

Descriptors: (*Brain, Nucleic acids), (*Conditioned reflex, *Nucleic acids), (*Learning, Nucleic acids), Behavior, Desoxyribonucleic acids, Ribonucleic acids, Proteins, Tissues (Biology), Biochemistry, Psychology.
Identifiers: Molecular psychobiology.

Two experiments were conducted to evaluate neurochemical changes in the ventral hippocampus of rats in a one way active avoidance conditioning task. The dependent variables were amounts of RNA, DNA, and proteins; ratios of these three; the specific activity of protein and tissue pool fractions; and the relative specific activity of the protein fraction. In these experiments a lower shock level was used than in previous experiments. The learning animals showed a tendency to greater specific activity of TCA and protein fractions and to a greater relative specific activity of the protein fraction in brain tissue than did non-learning animals. The results concerning individual brain tissues suggested that the medial ventral cortex, and possibly the posterior ventral cortex, may be involved in this type of learning. No significant

differences were found in the ventral hippocampus. (Author)
AD-646 701 HC$3.00 MF$0.65

A FREQUENCY THEORY OF VERBAL-DISCRIMINATION LEARNING,
Northwestern Univ., Evanston.
Bruce R. Ekstrand, William P. Wallace, and Benton J. Underwood. 27 Sep 65, 13p
Contract Nonr-1228 (15)
Availability: Published in Psychological Review v73 n6 p566-78 1966.

Descriptors: (*Learning, Performance (Human)), (*Reaction (Psychology), Learning), Training, Interference, Inhibition, Predictions, Analysis of variance, Verbal behavior, Word association, Perception (Psychology).

The frequency theory of verbal-discrimination (VD) learning postulates that the cue for discrimination is the difference in frequency of occurrence between the correct (C) and incorrect (I) alternatives of a VD pair. It is postulated that, as VD learning proceeds, at least a 2:1 frequency difference in favor of the C item is built up, and Ss use this difference as their cue. By always selecting the item with the greater perceived frequency of occurrence, Ss can perform efficiently. An experiment was presented which produced results in support of the frequency theory. The discussion centered on additional predictions of the theory and the evidence available in support of these predictions.
AD-646 705 Not available from CFSTI.

AN ANALYSIS OF SOME SHORTCOMINGS IN THE INTERFERENCE THEORY OF FORGETTING,
Northwestern Univ., Evanston.
Benton J. Underwood, and Bruce R. Ekstrand.3 Sep 65, 10p
Contract Nonr-1228 (15)
Availability: Published in Psychological Review v73 n6 p540-9 1966.

Descriptors: (*Recall, Predictions), (*Learning, Recall), Memory, Inhibition, Interference, Linguistics, Word association, Statistical analysis, Reaction (Psychology).

Tests of interference theory of forgetting as applied to extraexperimental sources of interference have been generally negative. The hypothesis was tested that the negative findings result from the fact that linguistic associations, presumed to interfere, do not do so because of their high level of learning, the distribution of their learning overtime, or both. The A-B, A-C paradigm was employed, with A-B being varied from 12-80 trials, and was learned either by massed practice or by distribution of practice over 4 days. Recall of A-C after 24 hrs. showed that distribution of A-B resulted in only small proactive inhibition (PI), while massing resulted in heavy PI. Degree of A-B learning influenced the recall only under massed A-B learning. Some implications for the development of forgetting theory were presented. (Author)
AD-646 706 Not available from CFSTI.

THE INTERACTION OF HIGH ALTITUDE AND PSYCHOTROPIC DRUG ACTION,
Army Medical Research and Nutrition Lab., Denver, Colo.
For primary bibliographic entry see Field 6O.
AD-646 728 Not available from CFSTI.

INDICANTS OF RESPONSE STRENGTH HIERARCHIES IN CONTINUED WORD ASSOCIATION.
Rochester Univ., N. Y.
Burton G. Andreas. Jan 67, 8p
HEL-TM-1-67
Availability: Published in Psychon. Sci. v6 n10 p447-8 1966.

Descriptors: (*Word association, Reaction (Psychology)), (*Reaction (Psychology), Psychometrics), Verbal behavior, Probability, Learning, Statistical functions, Memory, Perception (Psychology).

One minute of continued word association was shown to yield both the Noble (I 52) and Noble and Parker (1960) indicant of meaningfulness, m, and the Bilodeau and Howell (I 65) indicant of probability of response occurrence. The probability values (proportion of Ss giving particular responses) were determined over the entire period of response production as well as for the initial group of three responses. The median ordinal position of response occurrence was also calculated. The probability values of the present study correlated positively with those obtained by Bilodeau and Howell. Over the restricted range studied, these p values did not correlate significantly with median ordinal position.
AD-646 765 Not available from CFSTI.

PEER RATINGS FOR EXTREME PERFORMERS IN DISCUSSION GROUPS.
Technical rept.,
Stanford Univ., Calif. Graduate School of Business.
Thomas W. Harrell. Dec 66, 18p TR-14
Contract Nonr-225 (62)
Rept. on Perception of Leadership in Small Groups.

Descriptors: (*Group dynamics, *Perception (Psychology)), Leadership, Personality, Psychometrics.

Two hundred eighty-four subjects were studied in 40 five-man discussion group and 21 four-man discussion group. Thirteen of the 5-man groups consisted of participants in an Executive Development program, the others were Master of Business Administration students. During each discussion session an outside observer counted the number of times each man talked. After each session subjects answered a sociometric questionnaire including the ranks of all members including himself for Best Ideas, Most Guidance, and Leader. Subjects ranked all but himself on Best Liked. At the end of the respective courses these and other subjects completed a peer rating for the discussants and all other members of their classes. These peer ratings included positive choice as a prospective boss, negative choice as a boss, and positive and negative choices as a friend. Persons who were at the two extremes of the five measures of small group behavior were compared as to their number of peer rating choices. Eight differences out of 60 tested were significant at the .05 level or better. (Author)
AD-646 767 HC$3.00 MF$0.65

COMPARISON OF ROLE DIFFERENTIATION IN SEVERAL SITUATIONS.
Technical rept.,
Stanford Univ., Calif. Graduate School of Business.
David P. Gustafson. Dec 66, 29p TR-15
Contract Nonr-225 (62)
Rept. on Perception of Leadership in Small Groups.

Descriptors: (*Group dynamics, *Perception (Psychology)), Leadership, Personality, Psychometrics, Behavior, Sociometrics.

Twenty-four five man groups of MBA students discussed human relations cases in four half-hour sessions. There were 12 groups from the Stanford MBA class of 1966 and 12 from the class of 1967. An observer recorded the amount of time each student talked. Students ranked each other on Best Ideas, Guidance, Leader and Being Liked. Less role differentiation was found in both of these studies as compared with a study performed by Bales and Slater. Comparisons between these two studies at Stanford showed that one class tended to have less role differentiation by the fourth session. Differences in experimental conditions were discussed that could have reduced the subjects commitment and interest in the task in the class that had greater role differentiation. The study confirmed Bales and Slater's finding that role differentiation was less in groups with high status-consensus. (Author)
AD-646 768 HC$3.00 MF$0.65

PERCEPTION OF LEADERSHIP IN SMALL GROUPS.
Final rept.,
Stanford Univ., Calif. Graduate School of Business.
Thomas W. Harrell. Jan 67, 18p
Contract Nonr-225 (62)

Descriptors: (*Leadership, Perception (Psychology)), (*Group dynamics, *Perception (Psychology)), Personality, Psychometrics, Social communication.

Three hundred thirty-four men were studied in four and five man discussion groups. Some groups met for four sessions. An outside observer counted the number of times each man talked. Discussion group members rated the others and themselves on Participation, Best Ideas, Guidance, and Leadership. Discussion group members rated the others only on Being Liked. Subjects took a nine instrument personality test battery. At the end of the course subjects plus other class members rated each other on their positive and negative choices for Boss, Emotional Maturity, and Friend and Associate. There were no clear cut role differentiation at the end of four sessions. Peer ratings for positive and negative boss correlated significantly with current grade point average but not very much with test scores. There were some significant differences between the extreme performers in the small discussion groups on their peer ratings. There were a few significant personality test differences between the extreme performers in the small discussion groups. (Author)
AD-646 769 HC$3.00 MF$0.65

ITEM RESPONSE CHARACTERISTICS IN ATTITUDE AND PERSONALITY MEASUREMENT: A REACTION TO L. G. ROPER'S 'THE GREAT RESPONSE-STYLE MYTH'.
Final rept.,
Naval Personnel Research Activity, San Diego, Calif. Navy Training Research Lab.
Edward A. Rundquist. Jan 67, 16p
NPRA-STB-67-16

Descriptors: (*Attitudes, Psychometrics), (*Personality, Psychometrics), Reaction (Psychology), Naval personnel, Motivation, Applied psychology, Morale, Emotions, Behavior.

However defined, response style is not a myth. Responses to personality items are the result of, among other things, (a) item content (b) social desirability of this content, (c) form in which this content is stated, proportion of each form of statement in an inventory, (d) the desire to dissimulate with respect to the content, and (e) response style. Responses to form of statement--reversed items--conform perfectly to 1 definition of response bias. The differences in correlational and other characteristics of sets of reversed items are a major cause for the confounding and confusion in the interpretation of studies of social desirability and acquiescence. The great need is for external validation studies in relation to the factors that influence personality item responses.
AD-646 772 HC$3.00 MF$0.65

PURSUIT ROTOR PERFORMANCE: II. EFFECTS OF REINFORCING SUCCESSIVELY

LONGER INTERVALS OF CONTINUOUS TRACKING OVER PRACTICE SESSIONS.
Technical rept.,
George Washington Univ., Alexandria, Va. Human Resources Research Office.
Richard W. Sheldon, and John F. Bjorklund. Dec 66, 16p TR-66-22, Basic Research-9
Contract DA-44-188-ARO-2
See also AD-638 015.

Descriptors: (*Learning, Performance (Human)), (*Performance (Human), Tracking), Target acquisition, Group dynamics, Motor reactions, Motivation, Psychometrics, Behavior.

The objective was to determine whether pursuit rotor performance would be facilitated, and the level of achievement sustained, with the use of the reinforcement technique of shaping. The procedure used in this study was progressively lengthening, from session to session, the continuous target contact required to obtain a reinforcement, keeping the duration requirement constant within each session. Two groups of four subjects each practiced under the experimental conditions for ten 15-trial sessions. Reinforcement was provided during Sessions 2-7. Half of the experimental subjects improved appreciably during the reinforced practice. When reinforcement was withdrawn, the differences between the mean performance levels of the experimental subjects and a control group of eight subjects, who practiced without any reinforcement, were negligible.
AD-646 799 HC$3.00 MF$0.65

HEARING,
Johns Hopkins Univ., Baltimore, Md. Psychological Lab.
Wendell R. Garner. 1952. 20p
SPEC DEVCEN-166-1-132
Contract N5ori-166 (01)
Availability: Published in Annual Review of Psychology v3 p85-104 1952.

Descriptors: (*Hearing, Reviews), Psychoacoustics, Deafness, Noise, Information theory, Speech, Intelligibility, Electrophysiology, Ear, Audiometry, Masking, Thresholds (Physiology), Fatigue (Physiology), Auditory perception, Nerve cells, Pitch discrimination, Nervous system.

A review is presented of research programs which are investigating the hearing process. The report summarizes studies done in the following areas: Electrophysiology of the Cochlea; Audiometry; Loudness and Masking; Auditory fatigue and deafness; Short Duration Auditory Fatigue; Measurement of Neural Fatigue; Loudness Recruitment; Pitch; Localization of Sound; Binaural Interaction in the Nervous System; Hearing of Speech; Frequency Selectivity in the Nervous System; and Auditory Theory. The bibliography lists 87 reports.
AD-646 812 Not available from CFSTI.

GROUP BEHAVIOR IN LONG-TERM ISOLATION,
Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
Walter L. Wilkins. 1967. 23p
NAVMED-MF022.01.03-9001
Availability: Published in Psychological Stress p278-96 1967.

Descriptors: (*Group dynamics, Antarctic regions), (*Adjustment (Psychology), Antarctic regions), Behavior, Environment, Stress (Psychology), Emotions, Motivation, Acclimatization, Performance (Human), Effectiveness, Adaptation (Physiology).

The Antarctic provides an unequalled laboratory for the study of groups of men adapting themselves to a physically hostile environment. Criteria of effectiveness of group performance are reviewed and it is concluded that task motivation, emotional composure, and social compatability are needed in addition to technical competence. (Author)
AD-646 817 Not available from CFSTI.

PHOTOPIC RETINAL POTENTIALS EVOKED BY PHASE ALTERNATION OF A BARRED PATTERN,
Brown Univ., Providence, R. I. Hunter Psychology Lab.
For primary bibliographic entry see Field 6P.
AD-646 819 Not available from CFSTI.

MEMORY WITHOUT RECORD,
Illinois Univ., Urbana.
Heinz von Foerster. 1965. 67p
AFOSR-67-0311
Grants AF-AFOSR-7-63, PHS-10718-01
Prepared for presentation at the Conference of Learning, Remembering and Forgetting.
Availability: Published in The Anatomy of Memory v1 p388-433 1965.

Descriptors: (*Memory, Symposia), (*Brain, Memory), Nervous system, Information theory, Learning, Recall, Retention, Cerebral cortex, Ribonucleic acids, Nerve cells, Probability, Computers.

A mathematical description is given of possible modes by which memory is effected. The description is based on precise, quantitative definitions of the concept of uncertainty and the concept of order. The numerology of information theory is applied to some known features of the nervous system to derive an estimate of the amount of information necessary to specify a brain, based on a specification of the universe of brain in terms of a finite number of states and the probability of their occurrence. The number of states of the universe is estimated, i.e., the number of different networks that can be composed by directionally connecting n elements. The question as to what differentiates one network from another is approached from two different points: (a) purely structurally, where the operational modalities of the nodal elements are ignored, and (b) where the operational modalities of the nodal elements are considered in a structurally defined network. The description supports an hypothesis that the nervous system be viewed as if it were a computer whose internal organization changes as a result of its interaction with an environment that posses some order. The changes occur in such a way that some constraints in the environment that are responsible for its orderliness are mapped into the computer's structure. This homomorphism 'environment-system' reveals itself as 'memory' and permits the system to function as an inductive inference computer.
AD-646 844 Not available from CFSTI.

SENSORY COGNITION,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 6P.
AD-646 929 HC$3.00 MF$0.65

MOLECULAR NEUROCHEMISTRY OF THE BRAIN DURING CONDITIONED AVOIDANCE BEHAVIOR.
York Univ., Toronto (Ontario). Molecular Psychobiology Lab.
J. H. Davison, J. Gaito, J. Mottin, J. Rigler, and E. Schaeffer. 14 Oct 66, 38p MPL-4, AD-641615
Contracts NONR-4935/00/, NRC APB-110

Descriptors: *Brain, *Conditioned response, *Nucleic acid, *Rat, Acid, Behavior, Chemistry, Dna, Learning, Molecular, Neurology, Nucleic, Protein, Reflex, Response, Ribonucleic acid (rna), Tissue.

For abstract, see STAR 05 06.
N67-15660 HC$3.00 MF$0.65

TACTUAL PERCEPTION - EXPERIMENTS AND MODELS.
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 5H.
For abstract, see STAR 05 06.
N67-16661 HC$3.00 MF$0.65

EXPERIMENTAL STUDIES OF RELEVANCE JUDGEMENTS: THIRD PROGRESS REPORT.
System Development Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 5B.
PB-174 082 HC$3.00 MF$0.65

LOOKOUT ASSIST DEVICE FEASIBILITY STUDIES. VOLUME III. USAGE OF SOUND AT SEA, CONNING FUNCTION STUDIES, CUE SOURCES AND THEIR VALUE. PSYCHOACOUSTICS, PHYSICAL FACTORS, WORK ACTIVITY FACTORS.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 092 HC$3.00 MF$0.65

5K. SOCIOLOGY

A JOB DEVELOPMENT PROGRAM IN THE HOME AND APARTMENT MAINTENANCE INDUSTRY, A BUSINESS OPPORTUNITY.
Fry Consultants, Inc., Frankfurt am Main (West Germany).
For primary bibliographic entry see Field 5I.
PB-174 056 HC$3.00 MF$0.65

6. BIOLOGICAL AND MEDICAL SCIENCES

HEARING,
Johns Hopkins Univ., Baltimore, Md. Psychological Lab.
For primary bibliographic entry see Field 5J.
AD-646 812 Not available from CFSTI.

6A. BIOCHEMISTRY

EVALUATION OF IMMUNOASSAY METHODS FOR PROLACTIN IN BODY FLUIDS.
Final rept., 16 Aug 65-1 Jul 66,
Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
D. A. Dilley. Sep 66, 33p AMRL-TR-66-113

Descriptors: (*Pituitary hormones, Body fluids), Biological assay, Blood serum, Urine, Boranes, Antigen-antibody reactions, Quantitative analysis, Monkeys.
Identifiers: Prolactin.

A practical immunologic assay to detect the hormone, prolactin, in body fluids was evaluated. Prolactin content was assayed using positive antiprolactin sera prepared in rabbits and test samples of serum, urine, and urinary extract from a borane exposed female monkey in micro-Ouchterlony gel diffusion and agglutination inhibition tests. The gel diffusion test gave qualitative results while the agglutination inhibition test allowed quantitation of prolactin content. Results of the later test indicated a possible difference in pre- and postborane exposure prolactin content of monkey urine. Further work in this area will need to be done to clarify this preliminary evidence and to expand on its applicability to human exposure to boranes. (Author)
AD-646 432 HC$3.00 MF$0.65

EFFECT OF THE ANTIMALARIAL CHLOROQUINE ON THE PHOSPHOLIPID METABOLISM OF AVIAN MALARIA AND HEART TISSUE,

Naval Medical Research Inst., Bethesda, Md.
For primary bibliographic entry see Field 6O.
AD-646 504 Not available from CFSTI.

ELECTROMAGNETIC RADIATION CHEMISTRY.
Louisville Univ., Ky.
For primary bibliographic entry see Field 7E.
AD-646 645 HC$3.00 MF$0.65

POTASSIUM AND CREATININE AS INDEXES OF MUSCLE AND NONMUSCLE PROTEIN IN RATS.
Army Medical Research and Nutrition Lab., Denver, Colo. Physiology Div.
For primary bibliographic entry see Field 6P.
AD-646 686 Not available from CFSTI.

INDUCTION AND REGRESSION OF BIOCHEMICAL AND MORPHOLOGIC CHANGES INDUCED BY DIETARY LITHOCHOLIC ACID IN CHICKENS.
Army Medical Research and Nutrition Lab., Denver, Colo.
For primary bibliographic entry see Field 6P.
AD-646 688 Not available from CFSTI.

HELICAL PATH ELECTROPHORESIS IN VERTICAL FLUID SHEATHS.
California Univ., Los Angeles. Dept. of Biophysics and Nuclear Medicine.
Alexander Kolin. 18 Jul 66, 8p
Research supported by Office of Naval Research.
Availability: Published in Proceedings of the National Academy of Sciences v56 n3 p1051-8 Sep 66.

Descriptors: (*Electrophoresis, Separation), Fluids, Particles, Adsorption, Fluid flow, Thermal diffusion, Sedimentation, Rotation, Stabilization, Convection (Heat transfer), Instrumentation.

A modification of electrophoresis stabilized by electromagnetic rotation is presented which yields higher resolution, and permits processing of materials at higher concentration (higher-streak density). It is particularly suitable for separation of microscopic particles. The improvement is achieved by deforming the previously used circular path into a tall vertically oriented 'endless fluid belt.' High potential gradients in the order of 70 v/cm can be used without undue heating of the materials and without causing thermal convection. (Author)
AD-646 689 Not available from CFSTI.

THE ROLE OF IRON IN THE COPPER-ZINC INTERRELATIONSHIP IN THE RAT.
Army Medical Research and Nutrition Lab., Denver, Colo.
For primary bibliographic entry see Field 6P.
AD-646 690 Not available from CFSTI.

ULTRACENTRIFUGATION STUDIES WITH ABSORPTION OPTICS. V. ANALYSIS OF INTERACTING SYSTEMS INVOLVING MACROMOLECULES AND SMALL MOLECULES.
California Univ., Berkeley. Dept. of Molecular Biology.
I. Z. Steinberg, and H. K. Schachman. 22 Aug 66, 21p
Grants PHS-GM-12159, NSF-G-10795
Availability: Published in Biochemistry v5 n12 p3728-47 Dec 1966.

Descriptors: (*Ultracentrifuges, *Biophysics), (*Biochemistry, *Molecules), Albumins, Blood plasma, Bovines, Sedimentation, Chemical indicators, Optics, Absorption.
Identifiers: Methyl orange.

From both theoretical and experimental points of view the ultracentrifugal methods presented have much to commend them for the evaluation of interactions between large and small molecules. The theory for the sedimentation equilibrium technique is rigorous and its application straightforward. The assumptions and approximations are minimal and subject to experimental test. In contrast the sedimentation velocity method is not nearly as satisfactory from a theoretical point of view although experimentally it is more rapid and often simpler to apply. Taken together the two techniques constitute a powerful tool for the analysis of many interacting systems of biological interest. With the adaptation of the Rayleigh interferometer to the ultracentrifuge and the development of the photoelectric scanning absorption system the required data are readily obtained. Moreover, recent modifications in the latter optical system subsequent to the completion of the experimental work described above have led to greatly increased accuracy as well as sensitivity. As a result of these improvements the accuracy of both the sedimentation velocity and equilibrium measurements on interacting systems should be considerably enhanced.
AD-646 692 Not available from CFSTI.

THE USE OF CELLULOSE ACETATE FOR THE ELECTROPHORETIC SEPARATION AND QUANTITATION OF SERUM LACTIC DEHYDROGENASE ISOZYMES IN NORMAL AND PATHOLOGIC STATES.
Army Research Inst. of Environmental Medicine, Natick, Mass.
M. Mager, W. F. Blatt, and W. H. Abelmann. 13 Apr 66, 9p
Grants PHS-HE-07614, PHS-HE-00442
Availability: Published in Clinica Chimica Acta v14 p689-97 1966.

Descriptors: (*Oxidoreductases, Electrophoresis), Cellulose acetates, Diagnosis, Heart, Diseases, Hepatitis (Nonviral), Enzymes, Pathology, Blood serum, Lungs, Embolism, Cardiovascular diseases.
Identifiers: Myocardial infarction.

Normal and abnormal lactic dehydrogenase (LDH) isozyme distribution in serum was studied using cellulose acetate electrophoresis with a p-iodonitro tetrazolium violet (INT) stain, and a graphing procedure devised to permit rapid visualization and evaluation of the electrophoretograms. This diagnostic technique was validated by employing the system to analyze sera from 7 patients with acute myocardial infarct and 7 patients with parenchymatous liver disease. In each case elevation was noted in the appropriate tissue specific isozyme (LDH sub 1 and LDH sub 5 respectively). LDH isozyme patterns in 5 of 7 patients with pneumonia showed a modest elevation of LDH sub 1. Serial LDH isozyme patterns of 14 patients with acute pulmonary embolism, in 12 of whom total LDH was elevated, displayed a normal distribution. It is concluded that if tissue-specific LDH isozymes are released by the lung after embolization, their serum concentrations do not reach diagnostically useful levels. (Author)
AD-646 694 Not available from CFSTI.

EVALUATION OF AN ASSEMBLY FOR AUTOMATED COLUMN CHROMATOGRAPHY.
Army Research Inst. of Environmental Medicine, Natick, Mass. Pharmacology and Therapeutics Lab.
For primary bibliographic entry see Field 6L.
AD-646 696 Not available from CFSTI.

INFLUENCE OF SEX AND THYROID PRINCIPLES ON THE ANTIPROTEOLYTIC ACTIVITY OF RAT SERUM.
Army Medical Research Lab., Fort Knox, Ky. Biochemistry Div.
C. I. Wabner, J. L. Gray, and W. F. Blatt. 5 Nov 65, 15p
Availability: Published in Thrombosis et Diathesis Haemorrhagica v16 n1/2 p86-99 Jul 31 1966.

Descriptors: (*Plasmin, Inhibition), (*Sex hormones, *Blood coagulation), Thrombosis, Thyroid hormones, Peptide hydrolases, Steroids, Females, Males, Sex glands, Excision, Trypsin, Enzyme inhibitors, Thyroid gland, Thyroxine, Metabolism, Testosterone, Hemorrhage, Rats.
Identifiers: Estradiol.

Examination of antiproteolytic activity in rats administered sex steroids and thyroid principles revealed the following: Female rats display lower serum antitrypsin and antiplasmin activity than their male counterpart under all conditions investigated. In long-term experiments, antiplasmin values of castrated females returned to preoperative levels while male titers remained below the preoperative values. Testosterone propionate administration to intact female rats produced significant elevation of antitrypsin and antiplasmin titers whereas estradiol benzoate was largely ineffective in producing any major change in antiproteolytic activity. Surgical or medical thyroidectomy (propylthiouracil) initially produced a marked depression of antiplasmin activity followed by a restoration of preoperative levels. Administration of thyroxine or triiodothyronine to intact or hypothyroid rats led to a further decrease in titer which persisted throughout the course of study. It would appear that acute alteration in metabolic state, regardless of direction, may initiate a reduction in net antiplasmin activity. (Author)
AD-646 697 Not available from CFSTI.

MOLECULAR NEUROCHEMISTRY OF THE HIPPOCAMPUS AND OTHER BRAIN SITES DURING CONDITIONED AVOIDANCE BEHAVIOR.
York Univ., Toronto (Ontario). Molecular Psychobiology Lab.
For primary bibliographic entry see Field 5J.
AD-646 701 HC$3.00 MF$0.65

PANCREATIC ENZYMES OF THE SPINY PACIFIC DOGFISH. II. PROCARBOXYPEPTIDASE B AND CARBOXYPEPTIDASE B.
Doctoral theses.
Washington Univ., Seattle. Dept. of Biochemistry.
James W. Prahl, and Hans Neurath. 26 Sep 66, 10p
Contract Nonr-477 (35), Grant PHS-GM-04617
Availability: Published in Biochemistry v5 n12 p4137-45 Dec 1966.

Descriptors: (*Peptide hydrolases, *Fishes), Pancreas, Molecular weight, Amino acids, Chemical analysis, Chromatographic analysis, Electrophoresis, Purification.

Procarboxypeptidase B has been isolated from acetone powders of pancreas glands of the spiny Pacific dogfish, Squalus acanthias, and purified by chromatographic procedures. The zymogen has been characterized by determinations of molecular weight (44,500), end-group analysis, and amino acid composition. Activation by bovine trypsin yields carboxypeptidase B which has been crystalized and characterized by chemical and enzymatic procedures. The enzyme (molecular weight 34,500) resembles bovine and porcine carboxypeptidase B in amino acid composition, and like the bovine enzyme, dogfish carboxypeptidase B also hydrolyzes substrates for carboxypeptidase A. (Author)
AD-646 827 Not available from CFSTI.

NEUROPHYSIOLOGICAL MECHANISMS OF THE STATES OF SLEEP.
Lyon Univ. (France). Dept. of Experimental Medicine.
For primary bibliographic entry see Field 6P.
AD-646 846 HC$3.00 MF$0.65

IMMUNOFLUORESCENCE, AN ANNOTATED BIBLIOGRAPHY, SUPPLEMENT; AUTHOR AND SUBJECT INDEXES,
Army Biological Labs., Frederick, Md.
For primary bibliographic entry see Field 6E.
AD-646 859 HC$3.00 MF$0.65

LIFE PHENOMENA - A HISTORICAL SURVEY,
Israel Program for Scientific Translations, Ltd., Jerusalem.
For primary bibliographic entry see Field 6C.
For abstract, see STAR 05 06.
N67-15430 HC$3.00 MF$0.65

ISOLATION AND PROPERTIES OF A RNA-DNA COMPLEX FROM ESCHERICHIA COLI CELLS.
Vydeleniye I Svoystva Kompleksa Rnk-dnk Iz Kletok Escherichia Coli
National Aeronautics and Space Administration, Washington, D. C.
V. S. Tongur, and N. S. Vladychenskaya. Oct 66, 19p NASA-TT-F-10368
Transl. Into English From Biokhimiya (Moscow), V. 31, No. 3, 1966 P 484-490

Descriptors: *Deoxyribonucleic acid (dna), *Escherichia, *Isolation, *Ribonucleic acid (rna), Acid, Bacillus, Cell, Complex, Deoxy, Detergent, Growth, Method, Phenol, Property, Ribonucleic.

For abstract, see STAR 05 06.
N67-15560 HC$3.00 MF$0.65

MOLECULAR NEUROCHEMISTRY OF THE BRAIN DURING CONDITIONED AVOIDANCE BEHAVIOR.
York Univ., Toronto (Ontario). Molecular Psychobiology Lab.
For primary bibliographic entry see Field 5J.
For abstract, see STAR 05 06.
N67-15660 HC$3.00 MF$0.65

INHIBITION OF RNA SYNTHESIS BY ACTINOMYCIN.
O Podavlenii Sinteza Rnk Aktinomitsinom
National Aeronautics and Space Administration, Washington, D. C.
S. YU.Lukyanov, and N. G. Shuppe. Oct 66, 11p NASA-TT-F-10369
Transl. Into English From Biokhimiya (Ussr), V. 31, 1966 P 521-527

Descriptors: *Actinomycetes, *Nucleosynthesis, *Ribonucleic acid (rna), Acid, Analysis, Biochemistry, Cell, Composition, Cytology, Experiment, Inhibition, Nucleotide, Ribonucleic, Statistical, System.

For abstract, see STAR 05 06.
N67-15687 HC$3.00 MF$0.65

BRAIN AMINO ACIDS AND BIOGENIC AMINES UNDER VARIOUS ATMOSPHERIC MIXTURES SEMIANNUAL REPORT, MAY - 31 OCT. 1966.
San Francisco Univ., Calif. Inst. of Chemical Biology.
A. Furst. 12 Dec 66, 20p NASA-CR-81238
Contract NGR-05-029-001

Descriptors: *Biochemistry, *Brain, *Rat, Acid, Amine, Amino, Atmosphere, Environment, Oxygen, Tissue.

For abstract, see STAR 05 06.
N67-15883 HC$3.00 MF$0.65

REGULATION OF RNA SYNTHESIS FINAL SCIENTIFIC REPORT.
Centre D Enseignement Et de Recherches des Industries Alimentaires Et Chimiques, Brussels (Belgium).
R. Lavalle. 30 Sep 66, 21p AFOSR-66-2650, AD-642385
Contract AF-EOAR-65-16

Descriptors: *Ribonucleic acid (rna), *Synthesis, Acid, Amino, Control, Genetics, Growth, Mutation, Regulation, Ribonucleic.

For abstract, see STAR 05 06.
N67-16434 HC$3.00 MF$0.65

RESEARCH IN PHOTOSYNTHESIS QUARTERLY REPORT, JUN. 6 - SEP. 6, 1966.
Martin Co., Baltimore, Md. Rias Div.
B. Kok. 6 Sep 66, 38p NASA-CR-81345, QR-13
Contract NASW-747

Descriptors: *Chemical kinetics, *Chlorine compound, *Chloroplast, *Phenol, *Photosynthesis, Chemical, Chemiluminescence, Chlorine, Compound, Dichloride, Emission, Fluorescence, Illumination, Kinetics, Reaction.

For abstract, see STAR 05 06.
N67-16613 HC$3.00 MF$0.65

QUELQUES TECHNIQUES D'ETUDE DE L'ACTOMYOSINE PAR MICROSCOPIE ELECTRONIQUE (Some Techniques for Studying Actomyosin by Electron Microscopy),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
Max Herzberg. Dec 66, 22p CEA-R-3106
Text in French, attached summary in English.

Descriptors: (*Muscle proteins, *Electron microscopy), Adenosine phosphates, Chemical reactions, Peptides, Dissociation, Muscle proteins, Antibiotics, Platinum alloys, Carbon alloys, France.

A method was developed for shadowing using a platinum-carbon alloy; it was applied to the study of the interaction of actomysin with its substrate ATP. The results obtained seem to favour the hypothesis of a dissociation of the actomysin into its two components: actin and myosin. Pictures were obtained showing particles resembling nonpolymerized myosin but no rigorous proof of this exists. (Author)
PB-174 044 HC$3.00 MF$0.65

6B. BIOENGINEERING

MEASUREMENT OF STATIC MUSCLE ENDURANCE,
Army Medical Research Lab., Fort Knox, Ky.
Lee S. Caldwell. 24 Jul 64, 16p
USAMRL-609
Availability: Published in Journal of Engineering Psychology v3 n1 p16-22 Jan 1964.

Descriptors: (*Muscles, Strength), Measurement, Endurance, Fatigue (Physiology), Force (Mechanics), Psychophysiology, Human engineering, Performance (Human).
Identifiers: Biomechanics.

The primary purpose of this study was to explore the relationship between the strength and the endurance of an isometric manual response, and to compare two methods of measuring endurance. The main results of the study were as follows: (1) a highly significant correlation was obtained between initial maximum force and force endurance (the mean force maintained during a 60 sec maximum exertion), thus indicating a tendency for the stronger subjects to maintain greater force during a sustained contraction; (2) a non-significant correlation was obtained between strength and the mean percentage of strength sustained for 60 sec. Thus, there was no evidence in support of the statement by Tuttle et al that there is a tendency for stronger subjects of experience greater relative decrement in strength during a sustained maximum contraction; (3) a highly significant correlation was obtained between strength and decrement in relative strength; (4) the two tests of endurance (the time for which a response of half maximum strength could be maintained, and the mean strength maintained for 60 sec) measured little in common. (Author)
AD-646 400 Not available from CFSTI.

A SYSTEM FOR THE GENERATION OF MONOCHROMATIC RADIATION FOR PHOTOBIOLOGICAL INVESTIGATIONS.
Eine Anlage Zur Erzeugung Monochromatischer Strahlung Fuer Photobiologische Untersuchungen
National Aeronautics and Space Administration, Washington, D. C.
G. Schoser. Oct 66, 8p NASA-TT-F-10367
Transl. Into English From German

Descriptors: *Biology, *Generation, *Monochromatic radiation, Efficiency, Filter, Interference, Monochromatic, Optical, Output, Photography, Radiation, Range, Reflector, System.

For abstract, see STAR 05 06.
N67-15555 HC$3.00 MF$0.65

6C. BIOLOGY

ARTHROPOD TISSUE CULTURE. A BRIEF OUTLINE OF ITS DEVELOPMENT AND DESCRIPTIONS OF SEVERAL OF ITS APPLICATIONS,
Naval Medical Research Unit No. 2, Taipei (Taiwan).
For primary bibliographic entry see Field 6M.
AD-646 391 HC$3.00 MF$0.65

PENTOBARBITAL ANAESTHESIA IN THE HERRING AND LESSER BLACK-BACKED GULL.
Interim rept.,
Oxford Univ. (England). Dept. of Zoology.
Juan D. Delius. 1966, 7p
AFOSR-67-0134
Grant AF-EOAR-12-66
Availability: Published in J. Small Animal Pract. v7 p605-9 1966.

Descriptors: (*Birds, *Anesthesia), Barbiturates, Dosage, Injection (Medicine), Parenteral infusions, Respiration, Mortality rates, Surgery, Nervous system.
Identifiers: Bemegride.

A procedure for long lasting general anaesthesia in gulls (Larus sp.) is described. It is based on an initial basal intramuscular dose of pentobarbital sodium, supplemented if necessary by intravenous injection to effect of the same agent. Additional intramuscular pentobarbital is used to extend the duration of anaesthesia. The labile respiration of the birds is supported with oxygen. In cases of respiratory failure, intravenous methetharimide is an effective reactivator. A survival rate of better than 95 per cent has been achieved with this method in gulls undergoing neurosurgery for 2-3 hr. (Author)
AD-646 418 Not available from CFSTI.

CENTRIFUGAL FIBERS TO THE RETINA OF OCTOPUS VULGARIS,
University Coll., London (England). Dept. of Anatomy.
R. D. Lund. 13 Dec 65, 16p
AFOSR-67-0132
Grant AF-EOAR-53-66
Availability: Published in Experimental Neurology v15 n3 p100-12 May 1966.

Descriptors: (*Cephalopoda, *Retina), (*Nerve fibers, Retina), Degradation, Optic nerve, Patholo-

gy, Histology, Nerves, Granules, Blood vessels, Neurology, Great Britain.

A modified Glees method has been used to demonstrate degeneration in the retina of Octopus after cutting optic nerves or devascularizing the optic lobe by cutting the optic tract. The massive degeneration considered to be due to damage of a centrifugal pathway reaches a maximum at 1 day after optic nerve section and about 2 1/2 days after optic tract section at temperatures of between 16 and 19 C. The origin of the centrifugal pathway is deep to the cortex of the optic lobe and the termination of its fibers is around the bases of the retinal cell perikarya and possibly in the deeper part of the retinal plexus. (Author)
AD-646 430 Not available from CFSTI.

THE INDIVIDUAL SENSITIVITY OF DOGS TO RADIATION.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 6R.
AD-646 451 HC$3.00 MF$0.65

SOUTH AMERICAN SAVANNAS COMPARATIVE STUDIES LIANOS AND GUYANA.
McGill Univ., Montreal (Quebec). Dept. of Geography.
For primary bibliographic entry see Field 8F.
AD-646 514 HC$3.00 MF$0.65

REFLEX CONTROL OF ABDOMINAL FLEXOR MUSCLES IN THE CRAYFISH. I. THE TWITCH SYSTEM.
Stanford Univ., Calif. Dept. of Biological Sciences.
Donald Kennedy, and Kimihisa Takeda. 13 Jan 65, 20p
AFOSR-66-2370
Grants AF-AFOSR-334-63, PHS-NB-02944
Availability: Published in J. Exp. Biol. v43 p211-27 1965.

Descriptors: (*Crustacea, *Neuromuscular transmission), Reflexes, Abdomen, Muscles, Nerve impulses, Electrophysiology, Histology, Nerve cells, Nerve fibers, Stimulation, Responses, Nervous system, Physiology.

The flexor musculature of the crayfish abdomen is divided into two systems: a set of tonic superficial muscles, and a complex series of massive flexor muscles that produce powerful twitches but never exhibit tonic contractions. The muscle types are histologically differentiated, and also separately innervated: the main flexors receive ten large motor axons, and the slow superficial muscles six smaller ones. 2. Fibres of the main flexor muscles studied are almost all triply innervated; each receives endings from (a) the 'motor giant axon', (b) one of several specific non-giant motor axons, and (c) a common inhibitor. 3. Excitatory junctional potentials (e.j.p.s) due to motor giant and non-giant axons are similar and large; each may trigger secondary, active 'spikes', thus often producing post-junctional responses of 100 m V. or more. The responses differ in that the motor giant e.j.p. shows a dramatic decrease upon repetitive stimulation, whereas that due to non-giant motor axons exhibits some facilitation. 4. Activity in the central giant fibres drives both motor axons. The response to both when the motor giant system is fully rested, is slightly larger than that to either alone; when activated by stimulation of the central giant fibre the junctional potentials are evoked asynchronously due to differences in central reflex time, and double spiking in the muscle fibres sometimes results. Upon repeated stimulation the response to the giant is reduced to a very low level; this is accompanied by a decrease in the tension developed in successive reflexly evoked twitches. (Author)
AD-646 557 Not available from CFSTI.

PHYSICAL AND MECHANICAL PROPERTIES OF 'NORFOLK-ISLAND PINE' GROWN IN HAWAII.
Forest Products Lab., Madison, Wis.
For primary bibliographic entry see Field 2F.
AD-646 563 HC$3.00 MF$0.65

ULTRACENTRIFUGATION STUDIES WITH ABSORPTION OPTICS. V. ANALYSIS OF INTERACTING SYSTEMS INVOLVING MACROMOLECULES AND SMALL MOLECULES.
California Univ., Berkeley. Dept. of Molecular Biology.
For primary bibliographic entry see Field 6A.
AD-646 692 Not available from CFSTI.

AIR ION EFFECTS ON THE GROWTH OF THE SILKWORM (BOMBYX MORI L.).
California Univ., Berkeley.
A. P. Krueger, S. Kotaka, P. C. Andriese, K. Nishizawa, and Y. Kogure. 28 Mar 66, 10p
Contract Nonr-3656 (06)
Research supported in part by PHS. Prepared in cooperation with Tokyo Univ., (Japan), and Ibaraki National Univ. (Japan).
Availability: Published in International Journal Biometeorology v10 n1 p29-38 1966.

Descriptors: (*Lepidoptera, Growth), Air, Ions, Catalysts, Larvae, Life cycle, Hormones, Biosynthesis, Cytochrome oxidase, Catalase, Peroxidase.

The silkworm BOMBYX MORI L., was used to test the participation of catalysts in air ion action on insects. The larval growth and moulting of the silkworm are known to be dependent on the production of a growth and moulting hormone in the prothoracic glands or in other homologous thoracic organs. The primary function of this hormone is to stimulate the biosynthesis of cytochrome c and possibly other cytochrome components (Ariga, 1964; Gilmour, 1961). Accordingly, experiments were undertaken to determine the response of silkworm larvae to unipolar ionized atmospheres, using as criteria the rate of growth and the production of cytochrome c oxidase, catalase and peroxidase. (Author)
AD-646 704 Not available from CFSTI.

SOME STATISTICAL TREATMENTS COMPATIBLE WITH INDIVIDUAL ORGANISM METHODOLOGY.
Progress rept.,
Army Medical Research Lab., Fort Knox, Ky. Biophysics Div.
Samuel H. Revusky. 21 Feb 67, 49p
USAMRL-716
Rept. on proj. Effects of Electromagnetic Radiation on Performance.

Descriptors: (*Medical research, *Statistical analysis), Poisoning, Experimental design, Therapy, Irreversible processes, Sampling, Laboratory animals.

Consider experimental treatments with consequences so irreversible that baseline performance cannot be recovered. The conventional method of assessing the effects of such treatments by statistical means involves separate experimental and control groups. An alternative proposed here is to administer the experimental treatment to each subject, one subject at a time and in a random order; whenever any subject receives the experimental treatment, those subjects which have not yet received it receive a control treatment. This procedure permits results significant at the one-tailed .05 level to be obtained with four subjects; if a two-group procedure evaluated by means of the U test is used, a minimum of six subjects is needed for the same significance level. (Author)
AD-646 751 HC$3.00 MF$0.65

PANCREATIC ENZYMES OF THE SPINY PACIFIC DOGFISH. II. PROCARBOXYPEPTIDASE B AND CARBOXYPEPTIDASE B.
Washington Univ., Seattle. Dept. of Biochemistry.
For primary bibliographic entry see Field 6A.
AD-646 827 Not available from CFSTI.

ENVIRONMENTAL BIOLOGY.
Federation of American Societies for Experimental Biology, Bethesda, Md.
For primary bibliographic entry see Field 6F.
AD-646 890 MF$0.65

THE EFFECT OF CHLOROPHOS AND TEMPERATURE ON THE RESPIRATORY RHYTHM OF FLIES.
Army Biological Labs., Frederick, Md.
For primary bibliographic entry see Field 6F.
AD-646 920 HC$3.00 MF$0.65

BIOCHEMISTRY OF INSECT DEVELOPMENT, 1965-1966.
Final progress rept., 1 Feb 59-15 Mar 66,
Wisconsin Univ., Madison.
W. H. McShan, H. Roller, and J. S. Bjerke. 15 Mar 66, 13p
Contract Nonr-1202 (14)
Fourth renewal of original title: Metabolism of Insect Pests.

Descriptors: (*Insects, Biochemistry), Metabolism, Flight, Muscles, Blattidae, Ribonucleic acids, Plankton, Reproduction (Physiology), Hormones, Entomology.

Research was conducted in four areas of invertebrate zoology: (1) The fine structure and metabolism of flight muscle from American cockroaches, Periplaneta americana, kept at low, medium and high temperatures. (2) Determination of the relationship between the ribonucleic acid (RNA) content of zooplankton from several Wisconsin lakes to the productivity of these lakes. (3) Collection, purification, isolation, and identification of the sex-attractant from Galleria mellonella, the Greater Waxmoth. (4) Purification and isolation of the juvenile hormone from extracts of adult male Hyalophora cecropia.
AD-646 922 HC$3.00 MF$0.65

LIFE PHENOMENA - A HISTORICAL SURVEY.
Israel Program for Scientific Translations, Ltd., Jerusalem.
1966, 178p NASA-TT-F-381, TT-66-51018
Transl. Into English Of The Book "fizicheskie I Khimicheskie Osnovy Zhiznennykh Yavlenii - Istoricheskie Ocherki" Moscow, Izd. Akad. Nauk Sssr, 1963 Published For Nasa And Nsf

Descriptors: *Biological cell, *Chlorophyll, *Electrocardiography, *Embryology, *Field theory, Biological, Cell, Development, Field, History, Hypothesis, Literature, Photosynthesis, Physiology, Plant (biol), Review, Theory, U.S.S.R..

For abstract, see STAR 05 06.
N67-15430 HC$3.00 MF$0.65

CAROTENE CONTENT IN DUNALIELLA SALINA TEOD. ALGAE UNDER CONDITIONS OF LABORATORY CULTIVATIONS.
Vmist Karotynu U Vodorosti Dunaliella Salina Teod. Pry Vyroshchuvanni Yiyi V Laboratornykh Umovakh
National Aeronautics and Space Administration, Washington, D. C.
I. G. Drokova, R. TS. Popova, and N. D. Tup.
Dec 66, 11p NASA-TT-F-10433
Transl. Into English From Ukr. Biokhim. Zh. (Kiev), V. 21, No. 5, 1964 P 44-49

Descriptors: *Carotene, *Culture technique, *Dunaliella, Acid, Algae, Cell, Chloride, Composition.

Content, Culture (biol), Nutrient, Ribonucleic, Sodium, Technique, Vitamin, Yeast.

For abstract, see STAR 05 06.
N67-15688 HC$3.00 MF$0.65

REGULATION OF RNA SYNTHESIS FINAL SCIENTIFIC REPORT.
Centre D Enseignement Et de Recherches des Industries Alimentaires Et Chimiques, Brussels (Belgium).
For primary bibliographic entry see Field 6A.
For abstract, see STAR 05 06.
N67-16434 HC$3.00 MF$0.65

STUDY OF THE AUTOMATED BIOLOGICAL LABORATORY PROJECT DEFINITION VOLUME I - SUMMARY FINAL REPORT, 10 AUG. 1964 - 10 AUG. 1965.
Aeronutronic, Newport Beach, Calif.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 05 06.
N67-16575 HC$3.00 MF$0.65

STUDY OF THE AUTOMATED BIOLOGICAL LABORATORY PROJECT DEFINITION, VOLUME II - SCIENTIFIC PAYLOAD DEFINITION STUDIES FINAL REPORT, 10 AUG. 1964 - 10 AUG. 1965.
Aeronutronic, Newport Beach, Calif.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 05 06.
N67-16576 HC$3.00 MF$0.65

STUDY OF THE AUTOMATED BIOLIOGICAL LABORATORY PROJECT DEFINITION, VOLUME III - SYSTEM ENGINEERING STUDIES FINAL REPORT, 10 AUG. 1964 - 10 AUG. 1965.
Aeronutronic, Newport Beach, Calif.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 05 06.
N67-16577 HC$3.00 MF$0.65

STUDY OF THE AUTOMATED BIOLOGICAL LABORATORY PROJECT DEFINITION, VOLUME IV - PROGRAM PLAN FINAL REPORT, 10 AUG. 1964 - 10 AUG. 1965.
Aeronutronic, Newport Beach, Calif.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 05 06.
N67-16578 HC$3.00 MF$0.65

STUDY OF THE AUTOMATED BIOLOGICAL LABORATORY PROJECT DEFINITION, VOLUME V - EXOBIOLOGY BIBLIOGRAPHY FINAL REPORT, 10 AUG. 1964 - 10 AUG. 1965.
Aeronutronic, Newport Beach, Calif.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 05 06.
N67-16579 HC$3.00 MF$0.65

STUDY OF THE AUTOMATED BIOLOGICAL LABORATORY PROJECT DEFINITION, VOLUME VI - TECHNICAL APPENDICES, PART I FINAL REPORT, 10 AUG. 1964 - 10 AUG. 1965.
Aeronutronic, Newport Beach, Calif.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 05 06.
N67-16580 HC$3.00 MF$0.65

INVESTIGATION OF PEROGNATHUS AS AN EXPERIMENTAL ORGANISM FOR RESEARCH IN SPACE BIOLOGY SUMMARY PROGRESS REPORT, 1 JAN. - 31 DEC. 1966.
Northrop Space Labs., Hawthorne, Calif.
R. G. Lindberg. 31 Dec 66, 100p NASA-CR-81351, NSL-64-29-13
Contract NASW-812

Descriptors: *Bioastronautics, *Body temperature regulation, *Mouse, Anatomy, Biology, Body, Brain, Heat, Hibernation, Regulation, Rhythm, Space, Temperature.

For abstract, see STAR 05 06.
N67-16608 HC$3.00 MF$0.65

XVI INTERNATIONAL CONGRESS OF ZOOLOGY. VOLUME 5 - AN ACCOUNT OF THE CONGRESS.
National Academy of Sciences-national Research Council, Washington, D. C.
J. A. Moore. 1964, 175p NASA-CR-81349
Grant NSG-364
Proc. Held In Washington, D. C., 20-27 Aug. 1963

Descriptors: *Conference, *International cooperation, *Zoology, Biology, Cooperation, International, Nomenclature, Organization, Planning, Slide.

For abstract, see STAR 05 06.
N67-16610 HC$3.00 MF$0.65

EFFECTIVENESS OF DRY HEAT AND ETHYLENE GAS UPON SPORE CONTAMINATION LOCATED BETWEEN MATED SURFACES AND ON EXTERIOR SURFACES OF VARIOUS MATERIALS.
Army Biological Labs., Fort Detrick, Md. Physical Defense Div.
For primary bibliographic entry see Field 13H.
For abstract, see STAR 05 06.
N67-16614 HC$3.00 MF$0.65

THE ROLE OF BOTTOM-DWELLING MACROFAUNA IN WATER POLLUTION INVESTIGATIONS.
Public Health Service, Cincinnati, Ohio. Div. of Water Supply and Pollution Control.
For primary bibliographic entry see Field 13B.
PB-173 985 HC$3.00 MF$0.65

6D. BIONICS

MATERIALS STUDY FOR VISUAL TRANSFORMATION DEVICES.
Final rept., 1 Sep 64-30 Jun 66,
Moleculon Research Corp., Cambridge, Mass.
L. D. Nichols. 31 Jul 66, 79p MRC-G43-F
AFCRL-66-689
Contract AF 19 (628)-4346

Descriptors: (*Pattern recognition, Display systems), Viewing screens, Materials, Transformations, Propagation, Electroluminescence, Photoconductivity, Optical properties, Feedback.

A study of techniques for implementation of pattern recognition by uniform isotropic boundary propagation (the Blum process) was conducted. The desired component was a flat screen capable of performing this process on arbitrary high-contrast input images, providing both the basic propagation process and also satisfying the condition that confluent boundaries annihilate without crossing. Techniques studied include electroluminescent/photoconductive laminates, glow discharge phenomena, diffusion processes, thin film reactions, image storage tube systems, and thin film magnetic phenomena. Research was conducted on a theoretical level, including both analysis of basic propagation mechanisms and consideration of engineering parameters. The first three of the above systems appear potentially feasible, the EL/PC screen offering the most promise within the current state of the art. A prototype screen of this type was procured from Westinghouse and its behavior is described. Satisfactory propagation was not achieved, for reasons given. (Author)
AD-646 361 HC$3.00 MF$0.65

HARDWARE AIDS FOR AUTOMATA DESIGN.
RAND Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 9B.
AD-646 393 HC$3.00 MF$0.65

INFORMATION HANDLING PROPERTIES OF NEUROMIME NETS.
Systems Research Labs., Inc., Dayton, Ohio.
For primary bibliographic entry see Field 9B.
AD-646 441 HC$3.00 MF$0.65

FOREIGN SCIENCE BULLETIN VOL. 3, NO. 1, 1967.
Library of Congress, Washington, D. C. Aerospace Technology Div.
For primary bibliographic entry see Field 5A.
AD-646 634 HC$3.00 MF$0.65

A GENERALIZATION OF THE MOTZKIN THEOREM.
Parke Mathematical Labs., Inc., Carlisle, Mass.
For primary bibliographic entry see Field 12B.
AD-646 926 HC$3.00 MF$0.65

THE BASES OF AUTOMATION AND TECHNICAL CYBERNETICS.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 13H.
AD-646 933 HC$3.00 MF$0.65

TACTUAL PERCEPTION - EXPERIMENTS AND MODELS.
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 5H.
For abstract, see STAR 05 06.
N67-16661 HC$3.00 MF$0.65

6E. CLINICAL MEDICINE

PROCESSING NEUROELECTRIC DATA.
Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
William M. Siebert. 7 Jul 59, 128p TR-351
Contract DA-36-039-sc-78108

Descriptors: (*Electroencephalography, *Data processing systems), Computers, Mathematical analysis, Neurology, Probability, Psychiatry.

The report contains views and applications of processing data recorded from the nervous system. The purpose of the report is to provide material of common interest to the various branches of the communication sciences. Data processing techniques are discussed by the authors.
AD-218 859 HC$3.00

THE INFLUENCE OF INFECTION UPON SERUM PROTEIN CHANGES IN SEVERE BURNS
Brooke Army Medical Center, Fort Sam Houston, Tex. Army Surgical Research Unit.
J. Wesley Alexander, Wanda Brown, Arthur D. Mason, Jr., and John A. Moncrief. 1966, 11p
Availability: Published in The Journal of Trauma v6 n6 p780-9 1966.

Descriptors: (*Septicemia, Burns), (*Burns, *Blood proteins), Infections, Electrophoresis, Abscesses, Bacterial extracts, Septicemia, Pseudomonas aeroginosa, Globulins.

A parallel study comparing the electrophoretic patterns in two groups of comparable severely-burned patients, where fatal septic complications were seen frequently in one group and much less frequently in the other, was made to determine

what influence infection had upon the electrophoretic patterns following severe thermal injury. A second study in experimental animals compared the serum protein changes with burn, burn plus infection, infection associated with abscess formation, and the injection of bacterial extracts with neither burn injury nor infection. Those patients dying with septicemia caused by Pseudomonas aeruginosa or Staphylococcus aureus definitely tended to have a marked terminal depression of albumin with elevated gamma globulin and alpha-one globulin levels. With both moderate and severe infections, the alpha-two globulin levels tended to be high, but these were usually depressed terminally with fatal infections, possibly because of hemolysis with haptoglobin combining with free hemoglobin. Generally, however, the electrophoretic patterns for both groups were quite similar except at the time of actual septicemia. Infection of the burn wound in the experimental animal caused a characteristic increase in the alpha-one and alpha-two globulins and beta globulin, a mild depression of the gamma globulin, and severe depression of the albumin, with exceedingly low values found terminally. The induction of an abscess in itself caused similar changes which were even more marked at an earlier time. (Author)
AD-646 468 Not available from CFSTI.

VASODEPRESSOR EFFECT OF REOXYGENATION,
University of Western Ontario, London. Dept. of Pharmacology.
R. G. Burford, and C. W. Gowdey. 1966, 7p
Availability: Published in Aerospace Medicine v37 n11 p1114-20 Nov 1966.

Descriptors: (*Hypoxia, Therapy), Oxygen, Vasoactive agents, Cardiovascular system, Responses, Chemoreceptors, Blood circulation, Cats, Canada.

After a critical degree of hypoxia in anesthetized cats reoxygenation evoked a transient vasodepressor effect which occurred sooner and was more severe with oxygen than with room air. There was some bradycardia, slower respiration, rise in central venous pressure but no decrease in cardiac output. Section of the cervical vagosympathetics prevented the bradycardia but not the depressor response; nor did adrenalectomy or spinal section abolish it; central mechanisms were not essential as shown by cross-circulation experiments. Chemoreceptor denervation prevented the hypoxic pressor effect but not the reoxygenation depressor response. Total peripheral resistance and leg resistance increased during hypoxia; on reoxygenation both decreased during the vasodepressor effect. Carotid blood flow decreased on reoxygenation. Denervation of the hind leg did not prevent reoxygenation vasodilatation. It is suggested that at least part of the vasodepressor response may be caused by a transiently-acting vasodilator substance. (Author)
AD-646 470 Not available from CFSTI.

THE RELATIONSHIP OF SCUBA DIVING TO THE DEVELOPMENT OF AVIATORS' DECOMPRESSION SICKNESS.
Naval Medical Research Inst., Bethesda, Md.
For primary bibliographic entry see Field 6S.
AD-646 494 HC$3.00 MF$0.65

TOXIC EFFECT OF HIGH OXYGEN PRESSURES ON THE ANIMAL ORGANISM,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 6T.
AD-646 498 HC$3.00 MF$0.65

EFFECT OF HYDROXYETHYL STARCH ON PLASMA VOLUME AND HEMATOCRIT FOLLOWING HEMORRHAGIC SHOCK IN DOGS. COMPARISON WITH DEXTRAN, PLASMA, AND RINGER'S,
Naval Medical Research Inst., Bethesda, Md. Div. of Experimental Surgery.
Gordon C. Vineyard, Bruce E. Bradley, Alfred Defalco, Dexter Lawson, and Theodore A. Wagner. 6 Jan 66, 12p
NAVMED-MR-005.19.0004-14, NAVMED-MR005.02.0020-01
Availability: Published in Annals of Surgery v164 n5 p891-9 Nov 1966.

Descriptors: (*Plasma substitutes, *Shock (Pathology)), Dextran, Blood plasma, Solutions, Therapy, Blood pressure, Starches, Volume, Toxicity, Dosage, Mortality rates, Blood volume, Hematocrit, Dogs.
Identifiers: Ringer's solution, Hydroxyethyl starch.

Five different plasma substitutes--clinical dextran, low molecular weight dextran, homologous plasma, lactated Ringer's solution and hydroxyethyl starch solution--were used to treat dogs subjected to severe hemorrhagic shock. Criteria used to determine the amount of fluid given to each animal were mean arterial pressure and central venous pressure. Hydroxyethyl starch was demonstrated to be an effective plasma expander in dogs, comparing favorably with other plasma substitutes currently available. It lowered hematocrit more than the other solutions tested. Regarding survival, hydroxyethyl starch solution was superior to clinical dextran and significantly better than LMWD at 48 hours but not at one week. However, the volume of hydroxyethyl starch required was higher than that required with clinical dextran. Lactated Ringer's solution was also effective and with respect to mortality superior to clinical dextran. The total volume of lactated Ringer's required is much greater than for any of the other solutions tested. No evidence of toxic effects of hydroxyethyl starch were found even though the average dose exceeds 100 cc./Kg. or 6 Gm./Kg. Implications, including advantages and disadvantages of the treatment protocol, are discussed. The need for demonstrating that different groups of animals are comparable before treatment is stressed. (Author)
AD-646 505 Not available from CFSTI.

A NOTE ON THE GALACTIC RADIATION EXPOSURE IN GEOMAGNETICALLY UNPROTECTED REGIONS OF SPACE.
Naval Aerospace Medical Inst., Pensacola, Fla.
For primary bibliographic entry see Field 6R.
AD-646 583 HC$3.00 MF$0.65

THE GEOGRAPHIC DISTRIBUTION OF INFECTIOUS DISEASES.
Annual rept. no. 1, 15 Nov 65-14 Nov 66,
Universities Associated for Research and Education in Pathology, Inc., Bethesda, Md.
Harlan I. Firminger, and Howard C. Hopps. 15 Nov 66, 104p
Contract DA-49-092-ARO-130
Rept. on The Mapping of Disease (MOD) Proj.

Descriptors: (*Data processing systems, Infectious diseases), (*Infectious diseases, Mapping), Geography, Distribution, Ecology, Computer programs, Vocabulary, Environment, Leptospira, Diseases, Disease vectors, Maps, Graphics.
Identifiers: Hemorrhagic fever.

The accomplishments of the first year's work of the three year program, Computerized Mapping of Disease (MOD), are summarized as follows: (1) The broad outlines of the MOD computerized system were clearly defined, along with requirements of equipment, programs, and personnel. (2) A general data-analyses vocabulary, a detailed factor catalog, and a preliminary data-extraction/collection form were developed. (3) A large file of disease (leptospirosis and hemorrhagic fevers) and related environmental data was collected for use in the data-extraction/processing efforts. (4) Prototype disease-distribution maps were produced, both manually and by a computer/plotter system. (Author)
AD-646 666 HC$3.00 MF$0.65

METALBOLIC CHANGES IN HUMANS FOLLOWING TOTAL-BODY IRRADIATION.
Cincinnati Univ., Ohio. College of Medicine.
For primary bibliographic entry see Field 6R.
AD-646 667 HC$3.00 MF$0.65

ACUTE ULTRASTRUCTURAL EFFECTS OF 500 ROENTGENS ON THE LYMPH NODE OF THE MOUSE.
Armed Forces Inst. of Pathology, Washington, D. C.
For primary bibliographic entry see Field 6R.
AD-646 683 Not available from CFSTI.

ULTRASTRUCTURAL STUDIES ON THE LESION PRODUCED IN SKELETAL MUSCLE FIBERS BY CRUDE TYPE A CLOSTRIDIUM PERFRINGENS TOXIN AND ITS PURIFIED ALPHA FRACTION,
Armed Forces Inst. of Pathology, Washington, D. C.
Stanley W. Strunk, Chauncey W. Smith, and Joe M. Blumberg. 26 Jul 66, 19p
Availability: Published in The American Journal of Pathology v50 n1 p89-107 Jan 1967.

Descriptors: (*Muscles, Necrosis), (*Clostridium perfringens, Toxins + antitoxins), Musculoskeletal system, Cells (Biology), Degradation, Enzymes, Ferritin, Biopsy, Cell structure, Membranes (Biology), Morphology (Biology), Mitochondria, Nuclei (Biology), Guinea pigs, Pathology.
Identifiers: Lesions, Cell membranes.

Myonecrosis produced by Clostridium perfringens alpha toxin (lecithinase C) has been studied extensively in the past without definite demonstration of an initial lesion in the skeletal muscle cell. The properties of the alpha toxin have been investigated in depth and this enzyme has been found to hydrolyze various phospholipids of the cell membrane causing destruction of the cell. In the present study both ferritin conjugated and unconjugated toxin were injected into the skeletal muscle in the guinea pig flank. Biopsy specimens of muscle were examined by electron microscopy. The initial lesion observed was the appearance of discrete defects in the muscle plasma membrane. Utilizing the ferritin conjugated toxin, ferritin particles have appeared in and immediately adjacent to the defects or juxtaposed to the free edges of the cytoplasmic membrane. Other alterations observed have been degeneration of myofilaments, first evident in the I-and Z-band material but later involving the A-band filaments. The sarcoplasmic reticulum, mitochondria and cell nuclei underwent marked degenerative changes. All of these followed the initial lesions in the cell membrane, occurred independently of the presence of toxin within the cell, and most likely represented changes secondary to the initial lesion in the cell membrane. (Author)
AD-646 687 Not available from CFSTI.

THE USE OF CELLULOSE ACETATE FOR THE ELECTROPHORETIC SEPARATION AND QUANTITATION OF SERUM LACTIC DEHYDROGENASE ISOZYMES IN NORMAL AND PATHOLOGIC STATES,
Army Research Inst. of Environmental Medicine, Natick, Mass.
For primary bibliographic entry see Field 6A.
AD-646 694 Not available from CFSTI.

SOME STATISTICAL TREATMENTS COMPATIBLE WITH INDIVIDUAL ORGANISM METHODOLOGY.

Army Medical Research Lab., Fort Knox, Ky. Biophysics Div.
For primary bibliographic entry see Field 6C.
AD-646 751 HC$3.00 MF$0.65

STUDY OF PROGRESS OF ENAMEL CARIES IN TEETH OF NAVAL PERSONNEL.
Memorandum rept.,
Naval Submarine Medical Center, Groton, Conn.
William R. Shiller, and Francis P. Scola. 23 Dec 66, 11p NSMC-MR-66-20
NAVMED-MR005.19-6042.01

Descriptors: (*Military medicine, *Dentistry), Submarine personnel, Teeth, Diseases, Control.

The Dental Branch, Submarine Medical Research Laboratory at the Submarine Medical Center, conducted a two-year study of the rate of progress of carious lesions on the interproximal enamel surfaces of the teeth of a group of Naval personnel. A total of 305 of such small lesions were kept under observation for the two-year period. During this time only 34 per cent of the lesions had progressed to a point where their elimination and the placement of a restoration were definitely indicated. No teeth were lost because of these lesions in this period of time. It is concluded that where the patient load is such that all lesions cannot possible be eliminated, it is safe to leave such small lesions unrestored, if a regular system of re-examination is instituted to follow their progress. Application of preventive dentistry practices is felt to offer a possible avenue for the control of these lesions. (Author)
AD-646 795 HC$3.00 MF$0.65

ANTIBIOTIC PROPHYLAXIS OF CARRIERS OF SULFADIAZINE-RESISTANT MENINGOCOCCI,
Naval Medical Research Unit No. 4, Great Lakes, Ill.
For primary bibliographic entry see Field 6O.
AD-646 825 Not available from CFSTI.

A STUDY OF MILITARY IMPLICATIONS OF PROTECTIVE DEVICES DESIGNED TO PREVENT OR AMELIORATE HEAD AND NECK INJURIES.
Federation of American Societies for Experimental Biology, Washington, D. C. Life Sciences Research Office.
12 Sep 66, 67p
Contract DA-49-092-ARO-70

Descriptors: (*Head, *Crash injuries), (*Helmets, Aviation personnel), Aviation injuries, Wounds + injuries, Survival, Impact shock, Acceleration, Velocity, Surfaces, Safety harness, Ventilation, Test methods, Tolerances (Physiology), Design, State-of-the-art reviews, Symposia.

The major crash survival variables affecting the design and testing of U. S. Army aircrewmen helmets are presented and discussed. Such factors as head acceleration limits, impact velocity, impact surfaces, impact sites, suspension and retention harnesses, helmet ventilation, impact test methods, and structural concepts are considered. An examination of all available data on the tolerance of the human head to deceleration was conducted. Consideration was given to an analysis of acceptable design limits. A parallel study of head injuries occurring in aircraft accidents was conducted to determine the significant injury areas of the head and correlate this to protection area and techniques. A cockpit survey was conducted to develop criteria for testing the helmet and liner materials. Consideration was given during the program to a preliminary investigation of helmet retention systems and head cooling techniques. A series of instrumented drop tests was conducted to investigate various helmet design concepts and materials. Double-shell and single-shell helmets of nearly equal weight were analyzed. The advantages and disadvantages of three different methods of helmet impact testing are discussed. (Author)
AD-646 841 HC$3.00 MF$0.65

IMMUNOFLUORESCENCE, AN ANNOTATED BIBLIOGRAPHY. SUPPLEMENT; AUTHOR AND SUBJECT INDEXES,
Army Biological Labs., Frederick, Md.
Warren R. Sanborn. Dec 65, 28p Miscellaneous Pub-3

Descriptors: (*Fluorescent antibody techniques, Indexes), Subject indexing, Bacteria, Diseases, Virus diseases, Diagnosis, Fungi, Protozoa, Rickettsia, Animals, Serodiagnosis.
Identifiers: Metazoa.

This supplement to the six-volume series of annotated bibliographies (AD-630 175, AD-634 157, AD-628 666, AD-634 942, AD-635 467, and AD-637 933) provides a ready reference, arranged alphabetically, to all authors cited in the six volumes. It identifies senior authors and indicates precise location for each of the 1,895 citations in the series. In addition, a general subject index is included. It is arranged alphabetically, by subject, and indicates the volume and citation numbers for each of 65 general subjects with their associated sub-subjects. (Author)
AD-646 859 HC$3.00 MF$0.65

EXPOSURE OF MEN TO INTERMITTENT PHOTIC STIMULATION UNDER SIMULATED IFR CONDITIONS,
Civil Aeromedical Inst., Oklahoma City, Okla.
C. E. Melton, E. A. Higgins, J. T. Saldivar, and S. Marlene Wicks. Oct 66, 14p
AM-66-39

Descriptors: (*Adaptation (Physiology), Vision), (*Pilots, Adaptation (Physiology)), Electroencephalography, Vertigo, Epilepsy, Instrument flight, Light, Sensitivity, Aviation personnel, Aviation medicine, Beacon lights.

Ten men were subjected to intermittent photic stimulation in an airplane cockpit in an environmental chamber by (1) a Grimes red rotating beacon (1.5 FPS), (2) an Air Guard strobe light (1.0 FPS) and (3) propeller flicker (10 FPS). IFR conditions were simulated by passing steam into the cooled chamber. Electroencephalograms and electrooculograms were recorded for the 10 minute period prior to photic stimulation, during 10 minutes of photic stimulation, and for 10 minutes after stimulation. None of the lights provoked seizure, syncope, nystagmus or photic driving. The strobe light evoked complaints of irritation from 7 of the subjects and caused pacing of the alpha rhythm together with pulsating pupils. Three subjects became drowsy during the Grimes light, six became drowsy during propeller flicker, none complained of drowsiness during the strobe light. These sources of intermittent light appear to be innocuous to normal people. The commonest complaint was annoyance. Drowsiness was probably due to the environment and nature of the task.
AD-646 872 HC$3.00 MF$0.65

A STOCHASTIC MODEL OF INCUBATION-PERIOD DISTRIBUTIONS: MATHEMATICAL DEVELOPMENT.
Booz-Allen Applied Research, Inc., Bethesda, Md.
Apr 61, 131p BAARING-PRO-R-4
Contract DA-18-064-404-CML-206

Descriptors: (*Stochastic processes, Microorganisms), (*Microorganisms, Life span), Mathematical models, Probability, Infectious diseases, Immunology.

One of the least-understood processes in the course of infectious disease lies in the incubation period between the initial inoculation with a dose of organisms and the appearance of the first symptom of disease. In naturally occurring diseases, this lack of understanding arises from the fact that cases of infection rarely come under observation until the end of incubation. In laboratory experiments, observations have tended to concentrate on the period of frank disease between the end of incubation and recovery or death. The present work consists of a comprehensive mathematical investigation of a very simple stochastic model of the birth and death of microorganisms during an incubation period, in an attempt to explain the frequency distribution of the length of incubation and the variation of this distribution with size of initial dose. The model starts with the assumption that during incubation the microorganisms act entirely independently and that each individual microorganism has a constant probability of dying in each unit of time, and another constant probability of dividing into two organisms (birth). With the passage of time, the microorganisms in an inoculum either disappear or grow to a very large number.
AD-646 885 HC$3.00 MF$0.65

CBE FACTORS: MONTHLY SURVEY NO. 12.
Aerospace Technology Div., Library of Congress, Washington, D. C.
For primary bibliographic entry see Field 15B.
AD-646 899 HC$3.00 MF$0.65

ELECTRICAL ANESTHESIA TECHNIQUES,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
R. L. Wilbur. Nov 66, 28p
Contract AT (45-1)-1830

Descriptors: (*Anesthesia, Electric currents), (*Electric currents, Sleep), Nervous system.

For abstract, see NSA 21 04.
BNWL-317 HC$3.00 MF$0.65

STUDIES OF HEAVILY IONIZING PARTICLES AND SPACE BIOLOGY SEMIANNUAL REPORT.
California Univ., Berkeley. Lawrence Radiation Lab.
J. H. Lawrence, and T. Neville. 1966, 161p
NASA-CR-81246, UCRL-16898
Contract NASA ORDER R-104/2/09-019-900, W-7405-ENG-48

Descriptors: *Biological cell, *Radiation medicine, *Radiobiology, Animal, Bacteriophage, Biological, Cell, Dna, Electron, Growth, Hormone, Human, Medicine, Microbe, Polymorphism, Protein, Radiation, Serum, Study, Ultraviolet, X-ray.

For abstract, see STAR 05 06.
N67-15941 HC$3.00 MF$0.65

SURVEILLANCE OF VIRAL RESPIRATORY DISEASES AND VACCINE EVALUATION IN A PEDIATRIC POPULATION.
Semi-annual rept. 1 Mar-31 Aug 66,
California State Dept. of Public Health, Berkeley. Viral and Rickettsial Disease Lab.
Edwin H. Lennette. 31 Aug 66, 31p
Grant PHS-PH-43-63-1141

Descriptors: (*Respiratory diseases, Etiology), (*Vaccines, Effectiveness), (*Children, Respiratory diseases), Parainfluenza virus, Influenza virus, Infants, Serodiagnosis, Immunity, Adenoviruses, Poliomyelitis virus.
Identifiers: Respiratory syncytial virus.

Surveillance of acute respiratory illnesses (ARI) in the pediatric population at Fort Ord was maintained. Parainfluenza, type 3 was the virus most frequently isolated from children with ARI during the 1965-66 respiratory disease season. A few cases of ARI associated with influenza virus, type

A2 were found in February-March, 1966. A cohort analysis of the ARI experience of four groups of infants followed from birth showed that the effect of season on the cohort ARI rates was striking. A field trial of a tri-valent parainfluenza virus and a respiratory syncytial virus vaccine was getting underway in the longitudinal study infants and their siblings at the end of this report period. Further comparisons of CF and HI antibody titers from disc eluate and serum indicate that capillary blood collected on filter paper discs can be used in lieu of serum for the routine serologic diagnosis of the important pediatric respiratory viruses. The field trial of an encapsulated live adenovirus, type 4 vaccine in an Army recruit company revealed no spread of the vaccine virus to controls under normal training conditions. No interference or interaction of adenovirus vaccine was found with oral poliovirus, type 1 vaccine when the two vaccines were administered simultaneously. A study to determine the proportion of recruits who need to be immunized within a company unit to effectively control adenovirus disease was terminated because ARI rates among basic trainees dropped sharply after the onset of the study. (Author)
PB-174 069 HC$3.00 MF$0.65

6F. ENVIRONMENTAL BIOLOGY

SOUTH AMERICAN SAVANNAS COMPARATIVE STUDIES LLANOS AND GUYANA.
McGill Univ., Montreal (Quebec). Dept. of Geography.
For primary bibliographic entry see Field 8F.
AD-646 514 HC$3.00 MF$0.65

PROTECTION OF GEOPHYSICAL, COMMUNICATION AND POWER TRANSMISSION CABLE AGAINST RODENT SPECIES ATTACK BY R-55 RODENT REPELLENT TREATMENT,
Phillips Petroleum Co., Bartlesville, Okla. Commercial Development Div.
For primary bibliographic entry see Field 9A.
AD-646 536 HC$3.00 MF$0.65

ENVIRONMENTAL BIOLOGY.
Technical rept., 1965-66,
Federation of American Societies for Experimental Biology, Bethesda, Md.
Philip L. Altman, and Dorothy S. Dittmer. Nov 66, 718p
AMRL-TR-66-194
Contract AF 33(615)-2252. Grant PHS-GM-06553
Research supported in part by NASA.
Availability: Hard copy available from Federation of American Societies for Experimental Biology, Bethesda, Md. $15.00.

Descriptors: (*Biology, Environment), Handbooks, Stress (Physiology), Hypothermia, Temperature, Nervous system, Heat production (Biology), Metabolism, Oxygen consumption, Respiration, Humans, Animals, Plants (Botany), Microorganisms, Reproduction (Physiology), Cell division, Tissue culture, Adaptation (Physiology), Tolerances (Physiology), Radiation effects, Radiobiology, Photosynthesis, Electrophysiology, Responses, Audiometry, Auditory perception, Central nervous system, Blast, Hearing, Acceleration tolerance, Electroencephalography, Cardiovascular system, Performance (Human), Air pollution, Life support, Space medicine, Pressure breathing, High altitude, Hematology, Germination, Oxygen, Pressure, Gases, Water, Soils, Aquatic animals, Nutrition, Rhythm (Biology), Sound, Vibration, Impact.

CONTENTS: Temperature; Radiant Energy; Sound, Vibration, and Impact; Acceleration and Gravity; Atmosphere and Pollutants; Atmospheric Pressures; Gases; Water; Solutes; Biological Rhythms..
AD-646 890 MF$0.65

CBE FACTORS: MONTHLY SURVEY NO. 12.
Aerospace Technology Div., Library of Congress, Washington, D. C.
For primary bibliographic entry see Field 15B.
AD-646 899 HC$3.00 MF$0.65

THE EFFECT OF CHLOROPHOS AND TEMPERATURE ON THE RESPIRATORY RHYTHM OF FLIES.
Army Biological Labs., Frederick, Md.
Jun 66, 10p Trans-1741
TT-67-60989
Trans. of Meditsinskaya Parazitologiya i Parazitarnye Bolezni (USSR) n5 p527-32 1964.

Descriptors: (*Insecticides, *Musca), Effectiveness, Respiration, Dehydration, Temperature, Poisoning, USSR.
Identifiers: Chlorophos.

The tests on female and male Musca domestica L., Calliphora uralensis Vill. and C. erythrocephala Mg. showed that chlorophos, both during the contact and fumigant method of application, changed the respiratory rhythm of flies in the direction of lengthening the periods of ventilation of the tracheal system. It is proposed that the death of flies following chlorophos poisoning is promoted by the prolonged opening of the spiracles, ensuring a better entry of the insecticide through the tracheal system, and also the dehydration of the flies from the loss of water. In female C. uralensis following an increase of the surrounding air temperature up to 30 degrees, the periods of ventilation of the tracheal system are reduced, which may be evaluated as a protective adaptation for enduring unfavorable conditions of the external environment. In males of this species in a temperature of 30 degrees the periods of ventilation are extended, and consequently this adaptation is absent. (Author)
AD-646 920 HC$3.00 MF$0.65

WATER PESTICIDES NO. 1. STUDY NUMBER 24,
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
Raymond J. Lishka. 1966, 76p
PHS-Pub-999-WP-39

Descriptors: (*Insecticides, Selection), (*Pesticides, Gas chromatography), Separation, Solvent extraction, Statistical analysis, Detection, Water, Solutions, Sampling, Chemical analysis.

In this study, two solutions of ethyl acetate containing different mixtures of lindane, heptachlor epoxide, DDE, and dieldrin were analyzed, both before and after dilution with water, by 31 participating laboratories. One participant used paper chromatography, and the rest used gas chromatography; four of the latter employed the microcoulometric detector, and the rest used the electron capture detector. Best results were obtained with a mixed column packing containing both polar and nonpolar materials. Satisfactory results were also obtained with a single-component column when a prior separation of the pesticides by passage through a florisil or alumina chromatographic column was made before injection on the gas chromatograph. The newer model C-200 Dohrmann microcoulometer produced satisfactory results at the concentrations present in this sample. Failure to correct adequately for incomplete recovery of pesticide in the extraction procedure produced low results in the diluted sample.
PB-173 984 HC$3.00 MF$0.65

6G. ESCAPE, RESCUE, AND SURVIVAL

PHYSIOLOGICAL IMPLICATIONS AS TO SURVIVAL DURING IMMERSION IN WATER AT 75F,
Naval Medical Research Inst., Bethesda, Md.
For primary bibliographic entry see Field 6S.
AD-646 826 Not available from CFSTI.

6H. FOOD

NUTRITIONAL EVALUATION OF A PRECOOKED DEHYDRATED AND BITE-SIZED COMPRESSED FOOD DIET AS SOLE SOURCE OF NUTRIMENT FOR SIX WEEKS.
Final rept., Aug 63-Jun 66,
Miami Valley Hospital, Dayton, Ohio. Dept. of Research.
Keith J. Smith, Jul 66. 39p
AMRL-TR-66-3
Contract AF 33(657)-11716
Prepared in cooperation with NASA, Houston, Tex. Manned Spacecraft Center.

Descriptors: (*Diet, Astronauts), (*Dehydrated foods, Nutrition), Metabolism, Confined environments, Taste, Acceptability, Body weight, Digestive system, Hematology, Excretion, Blood chemistry, Space simulation chambers, Space medicine.

A series of experiments has been designed to determine the water, energy, and protein requirements of man under various simulated aerospace conditions. The 42-day experiment reported herein was designed to evaluate nutritionally an experimental diet composed of precooked dehydrated and bite-sized compressed foods. Organoleptically, the experimental diet was highly acceptable. The food items did not become less acceptable after having been served repeatedly or a long period of time. The nutritional balance data show that the experimental diet was highly utilized and that it efficiently maintained the subjects for the duration of the experiment. The confinement of the subjects for 28 days in the Aerospace Medical Research Laboratories Life Support Systems Evaluator did not affect subject body weight, nutrient balance, digestion, or water balance. No abnormal hematological or physiological measurements were recorded as a result of subsisting on the experimental diet. (Author)
AD-646 642 HC$3.00 MF$0.65

EFFECT OF IRRADIATION ON THE MICROBIAL FLORA SURVIVING IRRADIATION PASTEURIZATION OF SEAFOODS,
Oregon State Univ., Corvallis. Dept. of Food Science and Technology.
R. O. Sinnhuber, and J. S. Lee. 15 Apr 66. 64p
Contract AT(45-1)-1950
For abstract see NSA 21 05.

Descriptors: (*Seafood, Irradiated foods), (*Irradiated foods, Pasteurization), Microorganisms, Radiation effects, Radioactive isotopes, Nuclear industrial applications, Storage, Food.
RLO-1950-1 HC$3.00 MF$0.65

RADIATION TECHNOLOGY IN CONJUNCTION WITH POSTHARVEST PROCEDURES AS A MEANS OF EXTENDING THE SHELF LIFE OF FRUITS AND VEGETABLES.
Annual rept., 1 Feb 65-30 Jan 66,
California Univ., Davis. Dept. of Pomology.
E. C. Maxie, N. F. Sommer, and D. S. Brown. Oct 66. 135p
Contract AT(11-1)-34

Descriptors: (*Irradiated foods, Storage), Fruits, Vegetables, Gamma rays, Preservation.

For abstract, see NSA 21 04.
UCD-34P80-4 HC$3.00 MF$0.65

DOSIMETRY, TOLERANCE, AND SHELF LIFE EXTENSION RELATED TO DISINFESTATION OF FRUITS AND VEGETABLES BY GAMMA IRRADIATION.
Rept. for 1 Jun 65-31 May 66,
Hawaii Univ., Honolulu. Coll. of Tropical Agriculture.
E. K. Akamine, J. L. Brewbaker, and I. Buddenhagen. Sep 66, 106p
Contract AT (04-3)-235

Descriptors: (*Irradiated foods, Dosimeters), Fruits, Vegetables, Gamma rays, Preservation.

For abstract, see NSA 21 04.
UH-235P5-2 HC$3.00 MF$0.65

6J. INDUSTRIAL (OCCUPATIONAL) MEDICINE

THE RELATIONS OF HEARING LOSS TO NOISE EXPOSURE.
Massachusetts Inst. of Tech., Cambridge, Mass.
1954, 64p
Contract N5ori-078 (61)
Availability: Hard copy available from American Standards Association, Inc., 70 E. 45th St., New York 17, N. Y., at $1.50.

Descriptors: (*Noise, *Hearing), (*Industrial medicine, Noise), Deafness, Thresholds (Physiology), Exposure, Low frequency, Airplane noise, Jet engine noise, Audiometry, Tolerances (Physiology), Standards.

Contents: Definition of Variables: hearing loss, noise, exposure; The Human Problems of Industrial Noise; Presbycusis; Requirements for Field Data; Continuous Exposure to Steady Noise: The Relation of Hearing Loss at Certain Frequencies to Octave Band Levels; Average Net Hearing Loss Contours; Trend Curves: Estimates of Average Net Hearing Loss; Confirmation of the Trend Curves; Limitations of Trend Curves: Spectra and Extrapolations; Limitations of Trend Curves: Intermittent Exposure and Non-Steady Noise; Limitations of Trend Curves: Temporary Threshold Shift; Reduction in Temporary Threshold Shift after Cessation of Exposure; Exposure to Low-Frequency Noise; Gross Hearing Losses in Three Hypothetical Groups; Intermittent Exposure to Steady Noise: Airplane Noise; Jet-Engine Noise; Intermittent Exposure: Riveting Noise; Impulsive Noise: Proof-firing; Impact Noise: Drop Forge; Relation of Threshold Shifts to Initial Audiograms.
AD-646 775 Not available from CFSTI.

6K. LIFE SUPPORT

THE RELATIONSHIP OF SCUBA DIVING TO THE DEVELOPMENT OF AVIATORS' DECOMPRESSION SICKNESS.
Naval Medical Research Inst., Bethesda, Md.
For primary bibliographic entry see Field 6S.
AD-646 494 HC$3.00 MF$0.65

FINAL REPORT, 1 JULY 1961-1 JULY 1966.
Pennsylvania Univ., Philadelphia. Lab. of Pharmacology.
For primary bibliographic entry see Field 6T.
AD-646 556 HC$3.00 MF$0.65

TEMPERATURE CONTROL OF THE ORBITAL OTOLITH EXPERIMENT.
Technical memo.,
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
Paul R. Schrantz. May 66, 75p TG-815
Contract NOw-62-0604
Rept. on Design and Testing of Experimental Equipment.

Descriptors: (*Temperature control, *Life support), Vestibular apparatus, Transition temperature, Space simulation chambers, Heat exchangers, Design, Amphibians, Launching.

This report presents a description of the temperature control system that has been developed for the Orbital Otolith Experiment. The experiment has been packaged in a cylindrical vessel which will be installed in one of the first manned Apollo vehicles. A water supply in which two frogs are submerged must be maintained at 65 plus or minus 5 F for approximately 100 hours in orbit. The thermal design approach has been to thermally isolate the capsule from the Service Module. The total heat load may reach 20 watts including a continuous internal load of 12 watts. An evaporative cooling system has been developed for use during the time that the water temperature exceeds a thermostat setting of 65 F. Passive thermal control is employed during conditions of low ambient temperatures as well as during the prelaunch phase, when the evaporative cooler is inoperative. The program has reached the completion of the Engineering MoJel phase. This report includes a summary of the thermal vacuum test program which was carried out to verify the adequacy of the temperature control system. The results have been implemented in the design of the flight prototype and flight models to be supplied to NASA in 1966. (Author)
AD-646 921 HC$3.00 MF$0.65

6L. MEDICAL AND HOSPITAL EQUIPMENT

A TEN-EVENT TONE-CONTROL SYSTEM FOR THE PROGRAMMING OF EXPERIMENTS.
Research rept.,
Naval Medical Research Inst., Bethesda, Md.
Seward Smith, and Peter M. Edmondo. Dec 66, 13p
NAVMED-MF022.01.03.1002-22

Descriptors: (*Auditory signals, Control systems), Electronic recording systems, Signal generators, Circuits, Pulse systems, Sensory deprivation.

A tone control system for use in programming complex experiments is detailed. It utilizes coded tone-pulses recorded on a standard dual-track audio tape recorder. The system provides ten different coded pulses which are detected by a sound operated relay and a pulse steering network. The pulse steering network used to select which of the ten output pulses will appear at any instant is described in detail. A circuit diagram using standard Grason-Stadler relay components is given as is a circuit utilizing standard electronic components. (Author)
AD-646 638 HC$3.00 MF$0.65

EVALUATION OF AN ASSEMBLY FOR AUTOMATED COLUMN CHROMATOGRAPHY,
Army Research Inst. of Environmental Medicine, Natick, Mass. Pharmacology and Therapeutics Lab.
William F. Blatt, and Frank T. Pittman. 4 Mar 66, 11p
Availability: Published in Journal of Chromatography v24 p348-56 1966.

Descriptors: (*Chromatographic analysis, Instrumentation), Automation, Blood proteins, Laboratory equipment, Performance (Engineering), Reliability.
Identifiers: Spectrochrom.

An automated apparatus for column chromatography (Spectrochrom, Model 130) has been evaluated for performance and reliability. Although certain deficiencies exist, these would appear to be capable of correction. This apparatus has permitted us to greatly increase our scope in preparative and analytical column chromatography, and the feasibility of completely automating the techniques would appear to be justified. (Author)
AD-646 696 Not available from CFSTI.

AN ENVIRONMENTAL WHOLE-BODY PLETHYSMOGRAPH.
Interim rept. for Nov 65-Nov 66,
Naval Air Engineering Center, Philadelphia, Pa. Aerospace Crew Equipment Lab.
Edwin Hendler, Donald W. Dery, John B. Kearney, and Samuel Greco. 13 Jan 67, 5p NAEC-ACEL-545
NAVMED-MR-005.04-0046

Descriptors: (*Respiration, Measurement), (*Medical equipment, Environmental tests), Altitude, Lungs, Volume, Pressure, Thorax, Pressure breathing.
Identifiers: Plethysmography.

A device is described which functions both as a whole-body plethysmograph and as an environmental chamber, in which human subjects can be confined for prolonged periods. This device has been used to make pulmonary function measures while subjects have been exposed over 12 hour periods to air and 100 per cent oxygen, both at sea level and at altitude. (Author)
AD-646 721 HC$3.00 MF$0.65

SILICONE COATED TRAYS FOR PARAFFIN EMBEDDING,
California Univ., Berkeley. Dept. of Botany.
Eleanor Crump. 11 Apr 66, 4p
Grant NSF-GB-2489

Descriptors: (*Silicone plastics, Plastic coatings), (*Containers, Plastic coatings), (*Histological techniques, Containers), Embedding substances, Waxes, Laboratory equipment, Biological laboratories.

The permanent coating of porcelain embedding trays was attempted in order to assure fast and easy release of the solidified paraffin. Dow-Corning Silicone Pan Glaze provided fast, complete, and consistent release of the solidified paraffin. Preparatory to applying the silicon, the glazed surface of each porcelain embedding tray was sandblasted (grit-blasting or roughening the surface with No. 400 emery paper serve equally well) to assure satisfactory bonding of the silicone with the surface of the porcelain. Dow-Corning Silicon Pan Glaze was baked onto the sand-blasted surface at 400 F (a temperature high enough to melt the product) for 4 hr (a period of time sufficient to allow the product to flow and fill all pinholes). Once coated, a tray should last for hundreds of operations. Four coated trays were tested and found to have excellent and consistent mold releasing properties after 100 trials. Solidified paraffin blocks were released and could easily be removed from the trays within 50-70 sec after being placed in a crushed ice bath. Dow-Corning Silicone Pan Glaze is available commercially and can be brushed or sprayed onto the porcelain trays and cured in an ordinary oven. Since freeze-dried and freeze-substituted tissues are white to colorless, it is advantageous to use colored embedding trays. (Author)
PB-174 075 HC$3.00 MF$0.65

6M. MICROBIOLOGY

ARTHROPOD TISSUE CULTURE. A BRIEF OUTLINE OF ITS DEVELOPMENT AND DESCRIPTIONS OF SEVERAL OF ITS APPLICATIONS,

Naval Medical Research Unit No. 2, Taipei (Taiwan).
Earl C. Suitor, Jr. 23 Jun 66, 29p
NAMRU-2-Lecture and Review Ser-023, NAVMED-MF022.03.07-2014

Descriptors: (*Tissue culture, Arthropods), Arboviruses, Filariae, Tissue culture cells, In vitro analysis, Culture media, Microorganisms, Microbiology.

The development of arthropod tissue culture is outlined, with emphasis placed on lines of cells continuously propagated. Several results using this new laboratory tool at NAMRU-2, such as for arbovirus and microfilarial development, are presented. Examples of other applications and potentials are also listed. (Author)
AD-646 391 HC$3.00 MF$0.65

INDIRECT HEMAGGLUTINATION TEST FOR MYCOPLASMA PNEUMONIAE EMPLOYING A COMMERCIALLY AVAILABLE ANTIGEN AND ADAPTED TO THE MICROTITER TECHNIC.
Army Medical Research and Nutrition Lab., Denver, Colo.
Avrum B. Organick, and Abraham Resnick. 1 Dec 66, 19p USAMRNL-301

Descriptors: (*Mycoplasma, Antigen-antibody reactions), (*Serodiagnosis, Mycoplasma), Erythrocytes, Sensitivity, Microanalysis, Pleuropneumonia-like organisms, Test methods.
Identifiers: Indirect hemagglulination tests, Complement-fixation tests.

Two Mycoplasma pneumoniae antigens were compared employing an indirect hemagglutination method modified to a microtiter technic. Sonic treatment of the antigen immediately prior to sensitizing erythrocytes is an important step in the procedure. The IHA test must be performed on a larger number of sera in order to evaluate its usefulness. Other commercial sources of antigen for sensitizing erythrocytes should be investigated. (Author)
AD-646 462 HC$3.00 MF$0.65

JOURNAL OF MICROBIOLOGY, VOLUME X, NO. 1, 1964: SELECTED ARTICLES.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
31 Oct 66, 49p FTD-HT-66-169
TT-67-60854
Edited trans. of Wei Sheng Wu Hsueh Pao (Chinese People's Republic) v10 n1 p9-15, 24-9, 31-8 1964.

Descriptors: (*Japanese B encephalitis virus, *Vaccines), Immunity, Mice, Ribonucleic acids, Enzymes, Brain, Growth, Embryonated egg technique, Tissue culture, China.

The three articles are studies concerning the Japanese B Encephalitis virus. The first includes a study of the protective power of mice against intracerebral and subcutaneous attacks after having immunized them with the inactivated virus vaccine. The second article studies the infecting of mice with the vaccine and its observed RNA enzymic activity in the brain tissue. The third article reports on the results of investigations in the virus cultivation and vaccine preparation in chick embryo or mouse brain. (Author)
AD-646 585 HC$3.00 MF$0.65

LATENT VIRAL DISEASES IN THE DOG.
Armed Forces Inst. of Pathology, Washington, D. C. Geographic Pathology Div.
For primary bibliographic entry see Field 2E.
AD-646 684 Not available from CFSTI.

ULTRASTRUCTURAL STUDIES ON THE LESION PRODUCED IN SKELETAL MUSCLE FIBERS BY CRUDE TYPE A CLOSTRIDIUM PERFRINGENS TOXIN AND ITS PURIFIED ALPHA FRACTION.
Armed Forces Inst. of Pathology, Washington, D. C.
For primary bibliographic entry see Field 6E.
AD-646 687 Not available from CFSTI.

ANTIBIOTIC PROPHYLAXIS OF CARRIERS OF SULFADIAZINE-RESISTANT MENINGOCOCCI.
Naval Medical Research Unit No. 4, Great Lakes, Ill.
For primary bibliographic entry see Field 6D.
AD-646 825 Not available from CFSTI.

IMMUNOFLUORESCENCE, AN ANNOTATED BIBLIOGRAPHY. SUPPLEMENT; AUTHOR AND SUBJECT INDEXES.
Army Biological Labs., Frederick, Md.
For primary bibliographic entry see Field 6E.
AD-646 859 HC$3.00 MF$0.65

A STOCHASTIC MODEL OF INCUBATION-PERIOD DISTRIBUTIONS; MATHEMATICAL DEVELOPMENT.
Booz-Allen Applied Research, Inc., Bethesda, Md.
For primary bibliographic entry see Field 6E.
AD-646 885 HC$3.00 MF$0.65

A STUDY TOWARD DEVELOPMENT OF AN AUTOMATED MICROBIAL METABOLISM LABORATORY MONTHLY PROGRESS REPORT.
Hazleton Labs., Falls Church, Va.
G. R. Perez, and E. Usdin. 1 Nov 66, 53p NASA-CR-81263, MPR-1
Contract NASW-1507

Descriptors: *Life detector, *Microbiology, *Phosphate, *Sulfur, Assay, Biochemistry, Detector, Laboratory, Life, Metabolism, Photosynthesis, Radioactivity, Sensitivity, Soil, Substrate.

For abstract, see STAR 05 06.
N67-16503 HC$3.00 MF$0.65

AN EXPERIMENT TO DETECT MICROORGANISMS IN THE UPPER ATMOSPHERE FLOWN ON AEROBEE NASA 4.150.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
G. L. Picciolo, E. M. Powers, and E. Rich, Jr.. Dec 66, 29p NASA-TM-X-55642, X-624-66-359

Descriptors: *Aerobee rocket, *Dust collector, *Microorganism, *Upper atmosphere, Adenosine, Atmosphere, Detection, Phosphate, Rocket, Upper.

For abstract, see STAR 05 06.
N67-16545 HC$3.00 MF$0.65

SURVEILLANCE OF VIRAL RESPIRATORY DISEASES AND VACCINE EVALUATION IN A PEDIATRIC OPULATION.
California State Dept. of Public Health, Berkeley. Viral and Rickettsial Disease Lab.
For primary bibliographic entry see Field 6E.
PB-174 069 HC$3.00 MF$0.65

DEVELOPMENT AND PRODUCTION OF REAGENTS FOR THE IDENTIFICATION OF TUMORS INDUCED BY VIRUSES.
Semi-annual contract progress rept. 10 Jan-31 Aug 66,
Microbiological Associates, Inc., Bethesda, Md.
Klaus Schell. 31 Aug 66, 44p
Grant PHS-PH-43-62-200

Descriptors: (*Neoplasms, *Adenoviruses), (*Cancer, Etiology), Diagnosis, Tissue culture, Tissue culture cells, Growth, Preparation, Biological assay.

The report reviews experiments carried out on the following: production and ultracentrifugal concentration of some human and seventeen simian adenoviruses in an attempt to confirm or demonstrate oncogenicity and to produce tumor reagents; attempts to produce 'T' antigens free from virion antigens employing metabolic inhibitors and African green monkey kidney cells. Reports are given on some of the characteristics of the adenovirus type 12/SV-40 virus combination: lack of effect of ether, EDTA, RDE, Trypsin on infectivity or oncogenicity, partial inactivation of both with ethylene oxide, and possibly differential inactivation with Formalin (infectivity reduced below 'oncogenic levels' but oncogenicity retained), confirmation of sex differences in tumor response; and on the screening for AAV in many adenovirus seed stock preparations. A detailed report is made of the susceptibility of rabbit kidney cells of various passage levels to infection with SV-40 virus. (Author)
PB-174 070 HC$3.00 MF$0.65

ONCOGENICITY TESTING OF CANDIDATE VIRAL RESPIRATORY VACCINE STRAINS AND TUMOR REAGENT PROGRAMS.
Semi-annual contract progress rept. 1 Mar-31 Aug 66,
Flow Labs., Inc., Rockville, Md.
R. V. Gilden. 31 Aug 66, 47p
Grant PHS-PH-43-64-1169

Descriptors: (*Neoplasms, *Adenoviruses), (*Cancer, Etiology), Parainfluenza virus, Pleuropneumonia-like organisms, Volumetric analysis, Antigens + antibodies, Vaccines, Immunity, Fluorescent antibody techniques, Tissue culture.
Identifiers: Respiratory syncytial virus, Rhinoviruses.

Newborn hamsters, rats, and mice inoculated with a variety of virus or PPLO materials were observed for oncogenicity. No tumors were observed in hamsters inoculated with potential vaccine strains representing Adenovirus types 1-7, 21, 26, Parainfluenza types 1, 2, 3, Respiratory Syncytial virus, Rhinoviruses, and PPLO. Several new tumors developed in animals inoculated with purified human adenoviruses representing types 16, 21, and 10. The type 10 tumor is under intensive study since this virus type has not previously induced tumors. The reagent program produced relatively large quantities of high-titer serum antibody for most of the established tumor lines. In addition, the adequacy of immunization procedures using cell free preparations in Freund's adjuvant was shown. Studies were carried out on the thermal stability and salt solubility of the virus specific non-virion tumor antigens. Cross reactions among adenovirus T antigens were studied by fluorescent antibody techniques and it was shown that antigens detected in complement fixation tests and by fluorescent techniques were similar and that homologous reactions were greater than heterologous reactions by 50-200 fold. Attempts to confirm a report of loss of Adenovirus 12 oncogenicity by passage in porcine kidney were unsuccessful. (Author)
PB-174 071 HC$3.00 MF$0.65

DEVELOPMENTAL STUDY RELATING TO THE PREPARATION OF A RESPIRATORY SYNCYTIAL VIRUS VACCINE.
Semiannual contract progress rept. 1 Mar-1 Sep 66,
Flow Labs., Inc., Rockville, Md.
L. Potash. 1966, 20p
Grant PHS-PH43-64-943

Descriptors: (*Vaccines, Preparation), Viruses, Respiratory diseases, Growth, Tissue culture, Cul-

ture media. Tissue culture cells. In vivo analysis. Antigens + antibodies. Viability. In vitro analysis. Immunity. Stability. Zinc. Purification.
Identifiers: Respiratory syncytial virus.

Synopses of the release protocols relating to the preparation and safety testing of five live virus pools for use in human volunteer studies are presented. Techniques for producing macroplaques of RS viruses in primary AGMK and canine kidney petri dish cultures under agarose are described. The production of infectious RS fluids in different tissue culture systems for use in concentration and purification procedures is summarized. Studies on the effects of the virus/cell ratio in various tissue culture systems indicated no significant differences in yields of CF and/or infectious virus. In vivo quantitative tests for measurement of immunogenic potency are presented and include studies on the adaptation of the Maassab strain of RS virus to the CNS of newborn and 9-day old mice; intranasal infection of weanling hamsters with the subsequent determination of viral content in lung and trachea; comparative antibody reponses of guinea pigs to live and dead RS virus vaccines. In vitro quantitative tests for measurement of antigens and antibodies are described and include a microtissue culture system and the standardization of the 'accessory' factor employed as an aid in the serum-neutralization test. The zinc method for virus concentration was studied. Evidence is presented that the RS immunogen probably resides in the sedimentable fraction. Zinc-EDTA but not zinc alone appears to have some stabilizing effect on RS virus on storage at 4C. Studies indicate that protein precipitation by the zinc method is more directly related to the nature of the protein rather than on the concentration of the zinc employed. Various metods of RS CF antigen concentration are compared as the preliminary step towards preparing large amounts of purified RS immunogenic reagents. (Author)
PB-174 072 HC$3.00 MF$0.65

EFFECT OF IRRADIATION ON THE MICROBIAL FLORA SURVIVING IRRADIATION PASTEURIZATION OF SEAFOODS,
Oregon State Univ., Corvallis. Dept. of Food Science and Technology.
For primary bibliographic entry see Field 6H.
RLO-1950-1 HC$3.00 MF$0.65

60. PHARMACOLOGY

PENTOBARBITAL ANAESTHESIA IN THE HERRING AND LESSER BLACK-BACKED GULL,
Oxford Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 6C.
AD-646 418 Not available from CFSTI.

EFFECT OF THE ANTIMALARIAL CHLOROQUINE ON THE PHOSPHOLIPID METABOLISM OF AVIAN MALARIA AND HEART TISSUE,
Naval Medical Research Inst., Bethesda, Md.
J. Gutierrez. 1966. 8p
NAVMED-MR-005.09.0003-19, NAVMED-MR-005.09.1030-01
Availability: Published in American Journal of Tropical Medicine and Hygiene v15 n6 pt1 p818-22 1966.

Descriptors: (*Cinchona alkaloids, Metabolism), (*Phospholipids, Metabolism), Erythrocytes, Lipids, Chromatographic analysis, Acetates, Fatty acids, Plasmodium, Diseases, Stearic acids, Oleic acids, Heart, Turkeys.
Identifiers: Palmitic acids.

Turkey erythrocytes infected with Plasmodium fallax were incubated with C14-phosphatides, -acetate, and -fatty acids in the presence and absence of chloroquine. The C14-labeled lipids were fractionated on silicic acid columns and by paper chromatography, and the radioactivity for each fraction was assayed. The drug depressed uptake of acetate into fatty acids and phospholipids in both malaria-infected and normal erythrocytes. C14-stearic and palmitic acid incorporation into phospholipids of infected erythrocytes was increased by chloroquine while uptake of C14-oleic acid was depressed by the drug. Incorporation of C14-sodium acetate into fatty acids and phospholipids of turkey heart muscle homogenates was inhibited by the drug, and uptake of C14-stearic acid into phospholipids was stimulated by chloroquine. (Author)
AD-646 504 Not available from CFSTI.

THE INTERACTION OF HIGH ALTITUDE AND PSYCHOTROPIC DRUG ACTION,
Army Medical Research and Nutrition Lab., Denver, Colo.
Wayne O. Evans, and Norman J. Witt. 15 Apr 66. 6p
Availability: Published in Psychopharmacologia (Berl) v10 p184-8 1966.

Descriptors: (*Psychotropic agents, High altitude), Performance (Human), Narcotics, Amphetamines, Performance tests.

The purpose of this experiments was to provide an illustration of an interaction of a psychotropic drug with the changed subjective state of a subject as induced by a simulated high altitude environment. The Digit Symbol Substitution Test was administered to a group of subjects during two days of exposure to 2,000, 11,000, and 15,000 feet altitude in a high altitude chamber. The drugs used were codeine sulphate, desoxyephedrine hydrochloride, a mixture of these two drugs, and a lactose placebo. It was found that at 2,000 feet, desoxyephedrine enhanced performance and both codeine alone and a mixture of codeine and desoxyephedrine depressed performance. At 15,000 feet both codeine alone and the mixture of desoxyephedrine and codeine normalized the test performance; whereas the effect of desoxyephedrine was similar to the placebo. These results were interpreted as a demonstration of the interaction of drug effects with the subjective status of an individual. (Author)
AD-646 728 Not available from CFSTI.

ADRENERGIC BETA-RECEPTORS AND NON-SHIVERING THERMOGENESIS,
Toronto Univ. (Ontario). Dept. of Pharmacology.
For primary bibliographic entry see Field 6P.
AD-646 818 Not available from CFSTI.

ANTIBIOTIC PROPHYLAXIS OF CARRIERS OF SULFADIAZINE-RESISTANT MENINGOCOCCI,
Naval Medical Research Unit No. 4, Great Lakes, Ill.
John M. Dowd, Donald Blink, Charles H. Miller, Paul F. Frank, and W. E. Pierce. 11 Mar 66. 11p
RU-67.2
NAVMED-MR-005.09-1300.13
Availability: Published in Journal of Infectious Diseases v116 p473-80 Oct 1966.

Descriptors: (*Neisseria meningitidis, *Antibiotics), Sulfadiazine, Resistance (Biological), Oxytetracycline, Penicillins, Sensitivity, Dosage, Throat.
Identifiers: Erythromycin, Ampicillin, Carriers (Infectious diseases), Sulfanilamides.

The use of 4 antibiotics in an attempt to reduce the carrier state of sulfadiazine-resistant meningococci is reported. Oxytetracycline and erythromycin were more effective than oral potassium penicillin G in suppressing the isolation of meningococci from the nasopharynx during the treatment period, but neither led to permanent eradication of the organisms. In a separate controlled trial ampicillin was superior to oral penicillin G in reducing the carrier state during treatment. None of these antibiotics produced results as favorable as those previously reported with the use of sulfonamides against sulfadiazine-sensitive meningococci. The importance of typing and sulfonamide sensitivity testing of meningococci is stressed and the relative merits of various prophylactic measures are discussed. (Author)
AD-646 825 Not available from CFSTI.

CBE FACTORS: MONTHLY SURVEY NO. 12.
Aerospace Technology Div., Library of Congress, Washington, D. C.
For primary bibliographic entry see Field 15B.
AD-646 899 HC$3.00 MF$0.65

TOXICOLOGIC EVALUATION OF 2,2'- (9-10-ANTHRYLENEDIMETHYLENE) -BIS-2-PSEUDOTHIOUREA DIHYDROCHLORIDE DIHYDRATE (NSC-56054).
Supplementary rept.,
Mason Research Inst., Worcester, Mass.
Zareh Hadidian, David A. Cooney, and Ruth Davis. 27 Jun 66. 5p
Grant PHS-PH-43-65-51
See also PB-173 977.

Descriptors: (*Cancer, Chemotherapeutic agents), (*Chemotherapeutic agents, Toxicity), Rabbits, Guinea pigs, Pathology, Dosage, Urine, Muscles, Degradation, Histology, Tables, Polycyclic compounds, Organic sulfur compounds.
Identifiers: Dimethyl sulfoxide, Anthrylene dimethylene bis pseudothiourea.

Degeneration of muscle fibers at sites of injection was found in the majority of animals receiving intravenous injections. 25% DMSO in glucose caused some damage; its local effect is the most consistent toxicologic effect of this compound. The combined effect of the compound the solvent in this case was less than that of the compound alone in several other studies carried out, and cannot be considered to be a prohibitive factor in its clinical use. (Author)
PB-173 976 HC$3.00 MF$0.65

ADDENDUM TO TOXICOLOGIC EVALUATION OF TOXICOLOGIC 2,2'- (9,10-ANTHRYLENEDIMETHYLENE) - BIS - 2 - PSEUDOTHIOUREA DIHYDROCHLORIDE DIHYDRATE (NSC-56054).
Research rept.,
Mason Research Inst., Worcester, Mass.
David A. Cooney, and Ruth D. Davis. 21 Nov 66. 8p
Grant PHS-PH-43-65-51
See also PB-173 976.

Descriptors: (*Cancer, Chemotherapeutic agents), (*Chemotherapeutic agents, Toxicity), Monkeys, Dosage, Eye, Ophthalmology, Biopsy, Hematology, Blood chemistry, Tissues (Biology), Histology, Pathology, Tables, Polycyclic compounds, Organic sulfur compounds.
Identifiers: Dimethyl sulfoxide, Anthrylene dimethylene bis pseudothiourea.

Two monkeys were given 4ml/kg of a 25% solution of DMSO in saline intravenously daily for 28 consecutive days. During this period and for six weeks after the final dose, the animals were given a thorough eye examination every other week in addition to the routine weekly tests. The examination of the eyes included retinoscopy, slit lamp microscopy and funduscopy. The results of all of the examinations are tabulated. The two animals treated in the manner described showed no sign of toxicity. (Author)
PB-173 977 HC$3.00 MF$0.65

ACUTE ORAL ADMINISTRATION OF CFNU TO RHESUS MONKEYS.
Hazelton Labs., Inc., Falls Church, Va.
Howard Feinman, Thomas W. Tusing, Elton R. Homan, and David P. Rall. 18 Jan 67, 33p Rept. no. 200
Grant PHS-PH-43-63-1168
Prepared in cooperation with National Cancer Inst., National Inst. of Health, Bethesda, Md.

Descriptors: (*Cancer, Chemotherapeutic agents), (*Chemotherapeutic agents, Toxicity), Ureides, Monkeys, Dosage, Mortality rates, Body weight, Appetite, Hematology, Liver function tests, Kidney function tests, Blood chemistry, Pathology, Degradation, Histology.
Identifiers: Cyclohexyl fluoroethyl nitrosureas, Dimethyl sulfoxide.

The acute oral toxicity of 3-cyclohexyl-1- (2-fluoroethyl)-1-nitrosourea (CFNU) was evaluated in male and female rhesus monkeys. The compound was administered orally by stomach tube initially at levels of 5, 25, and 50 mg/kg of body weight, using one male and one female monkey per dose level. After an observation interval of 18 to 28 days the same animals received a second single dose of CFNU orally at levels of 125, 250, and 500 mg/kg of body weight. The CFNU was solubilized in undiluted DMSO at concentrations ranging from 0.5 to 50%. The criteria of effect evaluated were appearance and behavior, appetite and elimination, hematologic and biochemical studies, and gross and microscopic pathology. Single oral administration of CFNU killed one of two monkeys at 500 mg/kg of body weight and all animals survived doses of 250, 125, 25, and 5 mg/kg of body weight. Based on the mortality data the acute oral LD50 of CFNU in undiluted DMSO would be approximately in the range of 500 mg/kg of body weight. Single doses of 25 mg/kg and higher produced vomiting on one or more occasions during the first 24 hours following administration. The results of clinical laboratory studies revealed a reversal of the normal distribution of segmented neutrophil leukocytes to lymphocytes in one animal at each of the 125 and 250 mg/kg levels, and in both animals at the 500 mg/kg level. A moderate depression of the white blood cells was observed in both animals at the 500 mg/kg level. Altered liver and kidney function tests were found, as evidenced by increased blood urea nitrogen values, among the monkeys at the 50 mg/kg and higher levels, and increased transaminase values among the monkeys at each dose level. (Author)
PB-173 979 HC$3.00 MF$0.65

ACUTE IP ADMINISTRATION OF SODIUM FLUOROACETATE TO MALE ALBINO RATS; PROTECTION BY MONACETIN AGAINST LETHALITY OF SODIUM FLUOROACETATE AND 3-CYCLOHEXYL-1- (2-FLUOROETHYL)-1-NITROSOUREA (CFNU) TO MALE ALBINO RATS,
Hazleton Labs., Inc., Falls Church, Va.
Winnie R. Teeters, Thomas W. Tusing, Elton R. Homan, and David P. Rall. 23 Jan 67, 13p Rept. no. 204
Grant PHS-PH-43-63-1168
Prepared in cooperation with National Cancer Inst., National Inst. of Health, Bethesda, Md.

Descriptors: (*Cancer, Chemotherapeutic agents), (*Chemotherapeutic agents, Toxicity), Rats, Acetates, Dosage, Convulsive disorders, Protection, Mortality rates, Biopsy, Pathology, Histology.
Identifiers: Sodium fluoroacetate, Cyclohexyl fluoroethyl nitrosoureas, Monacetin.

Several experiments, using rats, were designed to tet the hypothesis that the toxicity of 3-cyclohexyl-1- (2-fluoroethyl)-1-nitrosourea (CFNU) may be attributed, in part, to the metabolic release of free fluoroacetate radical and its subsequent toxicity. Monacetin is assumed to afford protection gainst fluoroacetate toxicity by providing a readily available supply of intracellular acetate ions to inhibit the lethal synthesis of fluoroacetate to fluorocitrate. Studies designed to demonstrate the protective action of monacetin aginst the toxicities of fluoroacetate and CFNU were performed. Determination of the acute intraperitoneal LD50 of sodium fluoroacetate was conducted in male albino rats using 10 animals per level and doses of 0.215, 0.464, 1.0, 2.15, 4.64, and 10 mg/kg. The intraperitoneal LD50 was calculated to be 1.58 mg/kg with confidence limits of 1.36 to 1.90 mg/kg and an LT50 of 0.11 day. Tremors or clonic convulsions were noted with doses of 1.0 mg/kg and higher. Results indicated that following CFNU monacetin prolonged life, although death still ensued. The design of the protection study was therefore modified to include 24 hourly injections of monacetin in an effort to demonstrate protection against death. Three dosage levels of monacetin - 0.15, 0.25, and 0.45 ml. were included in the modified design. Groups of 10 animals received monacetin alone (0.45 ml. intramuscularly), CFNU alone (21.5 mg/kg orally), or combinations of CFNU with the different levels of monacetin. Lengthening the monacetin regimen (which also increased the total dose) proved efficacious in affording protection against CFNU lethality. (Author)
PB-173 980 HC$3.00 MF$0.65

ACUTE ORAL ADMINISTRATION OF CYTOSINE ARABINOSIDE TRIACETATE TO MALE ALBINO RATS AND MALE AND FEMALE RHESUS MONKEYS,
Hazleton Labs., Inc., Falls Church, Va.
Howard Feinman, Thomas W. Tusing, Elton R. Homan, and David P. Rall. 16 Jan 66, 13p Rept. no. 199
Grant PHS-PH-43-63-1168
Prepared in cooperation with National Cancer Inst., National Inst. of Health, Bethesda, Md.

Descriptors: (*Cancer, Chemotherapeutic agents), (*Chemotherapeutic agents, Toxicity), Pyrimidines, Glycosides, Acetates, Rats, Monkeys, Dosage, Hematology, Blood chemistry, Biopsy, Pathology, Body weight, Appetite, Tables.
Identifiers: Cytosine arabinoside triacetate.

The acute toxicity of cytosine arabinoside triacetate was evaluated following single oral administration in male albino rats and in male and female rhesus monkeys. Methyl cellulose suspensions of the compound were prepared at concentrations ranging from 400 to 500 mg/ml and administered by stomach tube. Single oral doses of cytosine arabinoside triacetate to male albino rats at levels ranging from 1000 to 5010 mg/kg of body weight produced no signs of toxicity and no deaths occurred. The acute oral LD50 was therefore estimated to be greater than 5010 mg/kg. Single oral doses of 500, 1500, 3000 and 4500 mg/kg were administered to rhesus monkeys using one male and one female animal per level. Vomiting occurred in each animal at each level during the first 24 hours. Diarrhea occurred in each animal at the three higher dose levels at some interval during the first three days following administration. Except for gastrointestinal effects the animals generally exhibited normal appearance, behavior, appetite, and maintained or gained weight during the observation period of six weeks. Clinical laboratory studies revealed no remarkable alterations in the hemograms of the monkeys during the post-dose observation period. Slight to moderate increases for serum glutamic oxaloacetic transaminase occurred in one or both monkeys at each dose level during the observation period. Serum glutamic pyruvic transaminase, fasting blood sugar, blood urea nitrogen, and alkaline phosphatase values remained within normal ranges. Gross necropsy of rats and monkeys at termination of the observation period revealed no evidence of gross pathologic changes that could be attributed to the administration of the compound. (Author)
PB-173 981 HC$3.00 MF$0.65

6P. PHYSIOLOGY

LOCALIZATION OF MONOAMINERGIC NEURONS IN THE CENTRAL NERVOUS SYSTEM OF ASTACUS ASTACUS LINNE (CRUSTACEA),
Lund Univ. (Sweden).
Rolf Elofsson, Tile Kauri, Sven-Olle Nielsen, and Jarl-Ove Stromberg. 12 May 66, 13p
AFOSR-67-0105
Grant AF-EOAR-14-66
Availability: Published in Zeitschrift fur Zellforschung v74 p464-74 1966.

Descriptors: (*Central nervous system, *Amines), (*Crustacea, Central nervous system), Fluorescence, Serotonin, Tryptophan, Nerve cells, Brain, Ganglia, Nerve fibers, Histological techniques, Sweden.

The cellular localization of biogenic monoamines in crustaceans was studied by means of a highly specific and sensitive fluorescence method devised by Falck and Hillarp. It was found that neurons displaying specific fluorescence in the central nervous system were confined to the protocerebrum, the medulla externa and the ventral nerve cord. The method allows a distinction between the fluorophores of 5-hydroxytryptamine (and 5-hydroxytryptophan), which emit the yellow light, and the fluorophores deriving from the catecholamines (and DOPA), which emit the green light. Green-fluorescent neurons occurred abundantly in the aforementioned parts of the central nervous system while yellow-fluorescent neurons were sparsely present in the same parts. (Author)
AD-646 414 Not available from CFSTI.

ADAPTIVE MECHANISMS IN HUMANS,
Laval Univ., Quebec. Dept. of Physiology.
Jacques Leblanc. 1966, 12p
Grant DRB-9310-79
Availability: Published in Annals of the New York Academy of Sciences v134 Art. 2 p721-32 Feb 28 1966.

Descriptors: (*Adaptation (Physiology), Humans), Stress (Physiology), Responses, Exposure, Shivering, Tolerances (Physiology), Sleep, Autonomic nervous system, Central nervous system, Acclimatization, Resistance (Biological), Metabolism, Oxygen consumption, Cardiovascular system, Canada.
Identifiers: Cold tolerance, Homeostasis.

All stressing conditions or environments are opposed by specific and nonspecific reactions. The reactivity to all types of stress depends on individual characteristics. Similarly, the responses to adverse conditions are greatly influenced by repeated exposure and contact. This influence is generally characterized by a decline in the specific responses and reactions normally experienced on acute exposure. Giving cold as an example, adaptation when achieved results in a decreased caloric cost, a reduction of the psychological disturbance of shivering and possibility to sleep at colder temperatures. For nonspecific reactions, identified primarily as signs of hyperactivity of the sympathetic system, adaptation is also possible. It is suggested that this type of adaptation which also brings a decline in reactions, originates in the central nervous system through habituation. All the mechanisms of adaptation minimize the responses of the organism and consequently broaden homeostasis. (Author)
AD-646 467 Not available from CFSTI.

FINAL REPORT, 1 JULY 1961-1 JULY 1966.
Pennsylvania Univ., Philadelphia. Lab. of Pharmacology.
For primary bibliographic entry see Field 6T.
AD-646 556 HC$3.00 MF$0.65

THE EFFECT OF WAVELENGTH ON VISUAL ACUITY.
Final rept., 1 Oct 65-31 Sep 66.

Eye Research Foundation, Bethesda, Md.
Carl Richard Cavonius. Jan 67, 22p ERF-RR-1/67-Cr
Contract DA-49-193-MD-2839

Descriptors: (*Color vision, Visual acuity), (*Visual acuity, Thresholds (Physiology)), Spectra (Visible + ultraviolet), Luminescence, Brightness, Display systems, Thresholds (Physiology), Background, Monochromatic light, Visual perception.

Visual acuity was measured in monochromatic light at wavelengths between 440 and 660 nm. The test objects were gratings which filled a 1.5 degree circular field centered in a 30 degree neutral surround. Luminance contrast between adjacent bars was adjustable, and acuity thresholds were determined for different contrasts. It was found that acuity depends primarily on luminance contrast and only slightly on wavelength, so that the same luminance contrast yields similar acuity thresholds at all wavelengths provided that the test objects are equated in luminance. It is suggested that the dominant wavelength of a visual display system (such as a cathode ray screen) is relatively unimportant in the perception of fine detail. Instead, criteria such as grain size and available luminance are more important. (Author)
AD-646 575 HC$3.00 MF$0.65

NEURONAL NETS,
Imperial Coll. of Science and Technology, London (England). Dept. of Electrical Engineering.
Jack D. Cowan. Jul 66, 72p
Contract N62558-4256

Descriptors: (*Nervous system, Electrophysiology), Anatomy, Physiology, Nerve cells, Nerve impulses, Membranes (Biology), Semipermeability, Electrolytes (Physiology), Electroencephalography, Responses, Stimulation, Sensory perception, Inhibition, Retina, Vision, Amphibians, Great Britain.

Contents: The Neuron; Neuronal Nets: the electroencephalogram; electrocorticograms and evoked responses; microelectrode recordings and slow potentials; functional aspects of nets.
AD-646 624 HC$3.00 MF$0.65

NUTRITIONAL EVALUATION OF A PRECOOKED DEHYDRATED AND BITE-SIZED COMPRESSED FOOD DIET AS SOLE SOURCE OF NUTRIMENT FOR SIX WEEKS.
Miami Valley Hospital, Dayton, Ohio. Dept. of Research.
For primary bibliographic entry see Field 6H.
AD-646 642 HC$3.00 MF$0.65

AMINO ACID UTILIZATION BY ISOLATED ADIPOSE TISSUE OF MEAL-FED RATS,
Army Medical Research and Nutrition Lab., Denver, Colo.
Gilbert A. Leveille. 26 Jul 66, 4p
Availability: Published in Proceedings of the Society for Experimental Biology and Medicine v123 p521-4 1966.

Descriptors: (*Adipose tissue, Metabolism), (*Amino acids, Metabolism), Rats, Nutrition, Ingestion (Physiology), Proteins, Fatty acids, Diet.

Meal-feeding (limiting access to food to 2 hours per day) in the rat stimulated the utilization of leucine- and lysine-14C by isolated adipose tissue. Epididymal adipose tissue from meal-fed rats incorporated significantly more amino acid carbon into protein and fatty acids than did similar tissue from nibbling (ad libitum-fed) animals. Greater quantities of amino acids were also oxidized by adipose tissue of meal-fed rats. The incorporation of leucine- and lysine-14C into protein and fatty acids was stimulated by addition of glucose to the incubation medium, and insulin addition resulted in a further stimulation. The possible regulatory mechanisms involved are discussed in light of available knowledge concerning adipose tissue metabolism. (Author)
AD-646 685 Not available from CFSTI.

POTASSIUM AND CREATININE AS INDEXES OF MUSCLE AND NONMUSCLE PROTEIN IN RATS,
Army Medical Research and Nutrition Lab., Denver, Colo. Physiology Div.
Kenneth S. K. Chinn. 11 Jul 66, 9p
Availability: Published in The Journal of Nutrition v90 n3 p323-30 Nov 1966.

Descriptors: (*Potassium, Chemical analysis), Muscle proteins, Proteins, Mathematical analysis, Gravimetric analysis, Tissues (Biology), In vivo analysis, Urine, Excretion, Rats.
Identifiers: Creatinine.

Rate of creatinine formation in vivo was studied in 29 albino rats (12 full-fed males, 10 restricted-fed males and 7 full-fed females) ranging in age from 81 to 188 days. Equations for predicting the quantities of muscle, nonmuscle and total body protein were formulated by using total body potassium and 24-hour urinary creatinine excretion. Predicted values of muscle, nonmuscle and total body protein agree with the gravimetrically determined values within plus or minus 4.17%, plus or minus 7.50% and plus or minus 3.41%, respectively, in rat carcasses. (Author)
AD-646 686 Not available from CFSTI.

INDUCTION AND REGRESSION OF BIOCHEMICAL AND MORPHOLOGIC CHANGES INDUCED BY DIETARY LITHOCHOLIC ACID IN CHICKENS,
Army Medical Research and Nutrition Lab., Denver, Colo.
G. A. Leveille, N. W. King, H. E. Sauberlich, and D. G. Fairchild. 21 Jul 65, 8p
Availability: Published in American Journal of Veterinary Research v27 n119 p1045-52 Jul 1966.

Descriptors: (*Bile, Diet), (*Liver, Morphology (Biology)), Lipids, Desoxyribonucleic acids, Carboxylic acids, Ingestion (Physiology), Histology, Necrosis, Pathology, Chickens.
Identifiers: Lithocholic acid, Hydroxyproline.

Plasma and liver lipids and hepatic morphologic changes were studied daily throughout a 7-week experimental period in chicks fed diets devoid of bile acids or supplemented with 0.2% lithocholic acid. Regression of the induced alterations was studied by withdrawing lithocholic acid from the diet of some chicks after 3 weeks. Dietary lithocholic acid increased plasma lipids within 5 to 7 days. Liver size, deoxyribonucleic acid (DNA), and hydoxyproline content had increased, and the ductular cell reaction was evident after 3 days of lithocholic acid feeding. The ductular cell reaction reached a maximum after 24 days. The induced changes regressed rapidly when lithocholic acid was withdrawn from the diet. The plasma and liver lipids had returned to normal within 4 to 5 days. Liver size and morphologic features were essentially normal after 2 weeks. (Author)
AD-646 688 Not available from CFSTI.

THE ROLE OF IRON IN THE COPPER-ZINC INTERRELATIONSHIP IN THE RAT,
Army Medical Research and Nutrition Lab., Denver, Colo.
Kenneth E. Kinnamon. 21 Mar 66, 8p
Availability: Published in The Journal of Nutrition v90 n3 Nov 1966.

Descriptors: (*Iron, Metabolism), (*Zinc, Diet), (*Copper, Diet), Toxicity, Growth, Absorption (Biological), Tissues (Biology), Rats.

The effects of dietary supplements of copper (0.02%), iron (0.04%) and zinc (0.75%) on growth and iron metabolism of rats were observed. Although diets with elevated levels of iron significantly lowered uptake, dietary zinc or copper had no significant effect on absorption of orally administered radioactive iron, 96 hours prior to death. Diets high in zinc did, however, significantly lower retention of chronically administered dietary radioactive iron as well as decrease liver iron stores. The data suggest that iron absorbed from the digestive tract was apparently following a normal metabolic pathway after 96 hours, but later deviated significantly under conditions of zinc toxicity. Copper levels were not significantly altered under
AD-646 690 Not available from CFSTI.

REGIONAL DISTRIBUTION IN OESOPHAGEAL TEMPERATURE AND ITS USE IN LOCALIZING MEDIASTINAL ORGANS AND MONITORING CENTRAL BLOOD TEMPERATURE.
Annual scientific rept.,
Institute of Occupational Health, Helsinki (Finland).
Pekka Piironen. 30 Apr 66, 27p
AFOSR-67-0279
Grant AF-EOAR-71-65

Descriptors: (*Esophagus, Temperature), Blood circulation, Monitors, Thyroid gland, Trachea, Aorta, Heart, Tissues (Biology), Temperature sensitive elements, Finland.

Distribution of temperature along the length of the oesophageal lumen conforms to a basic pattern, in which the configurational details correspond to the regional distribution of various mediastinal organs around and in the immediate vicinity of the oesophagus. Such organs and tissues (e.g. thyroid, trachea, aortic arc, left atrium, etc.) can therefore be localized in relation to the oesophagus by finding the corresponding configuration in the oesophageal temperature distribution. In the region in which the oesophagus is in intimate contact with the descending aorta and left atrium its lumen temperature seems to reflect closely the temperature of central circulating blood; it follows with only slight distortion, damping and lag the sinusoidal alterations induced in the latter. (Author)
AD-646 764 HC$3.00 MF$0.65

ADRENERGIC BETA-RECEPTORS AND NONSHIVERING THERMOGENESIS,
Toronto Univ. (Ontario). Dept. of Pharmacology.
E. Schonbaum, G. E. Johnson, E. A. Sellers, and M. J. Gill. 1966, 2p
Availability: Published in Nature v210 n5034 p426 Apr 23 1966.

Descriptors: (*Heat production (Biology), *Sympatholytic agents), (*Shivering, Heat production (Biology)), Adipose tissue, Metabolism, Electrophysiology, Acclimatization, Dosage, Muscles, Chemoreceptors.
Identifiers: Propranolol.

A study was made of the effect of beta-adrenergic blockade on electrical muscle activity in rats exposed to about 4C after acclimatization to 23C or 4C. None of the animals shivered during an experimental period of 2.5 h when treated with saline. A seventh rat showed signs of shivering and was therefore excluded from this series. After treatment with propranolol, all six rats showed a marked increase of electrical muscle activity. It is concluded that beta-adrenergic blockade interferes with non-shivering thermogenesis so that heat production, mediated by electrical muscle activity, increased.
AD-646 818 Not available from CFSTI.

PHOTOPIC RETINAL POTENTIALS EVOKED BY PHASE ALTERNATION OF A BARRED PATTERN,
Brown Univ., Providence, R. I. Hunter Psychology Lab.

E. Parker Johnson, Lorrin A. Riggs, and Amy M. L. Schick. 1964, 18p
Grant PHS-NB-01453
Research supported in part by ONR. Prepared in cooperation with Colby College, Waterville, Me.
Availability: Published in Clinical Electroretinography, Supplement to Vision Research, Proceedings International Symposium (3rd), p75-91 1964.

Descriptors: (*Color vision, Electroretinography), Retina, Vision, Eye, Monochromatic light, Adaptation (Physiology), Brightness, Visual acuity, Sensitivity, Responses, Psychophysics, Spectra (Visible + ultraviolet).

Monochromatic light, at seventeen selected points in the spectrum, was presented to the light-adapted eyes of three color-normal observers. Spectral sensitivity curves were determined (a) by conventional psychophysical procedures which involved subjective, heterochromatic brightness-matches, and (b) through the recording of evoked retinal potentials (ERG). For the latter a new procedure was employed, a variant form of flicker-electroretinography, in which there is presented a patterned stimulus consisting of illuminated bars, the brighter and darker sets of bars alternating position 10.7 times each second. Responses were recorded during continuous stumulation, with electronic methods employed to cumulate and average 256 half-second segments of the response. This technique reduced 'noise' to a level that permitted routine recording and measurement of responses at and below the 1 microvolt level. From theoretical considerations as to the nature and the conditions for the arousal of scotopic and photopic components of the ERG, and from comparisons of the sensitivity-curves obtained in the present work, it was concluded that the new procedure offers an opportunity to study objectively such photopic visual functions as specific color responses, acuity, and brightness discrimination. (Author)
AD-646 819 Not available from CFSTI.

NEUROPHYSIOLOGICAL MECHANISMS OF THE STATES OF SLEEP.
Final rept., Oct 65-Oct 66,
Lyon Univ. (France). Dept. of Experimental Medicine.
Michael Jouvet. Oct 66. 11p
AFOSR-67-0368
Grant AF-EOAR-94-65

Descriptors: (*Sleep, Biochemistry), Amines, Serotonin, Enzyme inhibitors, Amphetamines, Reserpine, Fatty acids, Atropine, Brain, Levartcresol, Mental disorders, Metabolism, Pharmacology, Histology, Nervous system, France.
Identifiers: Paradoxical sleep, Slow wave sleep.

Research was performed in order to establish with more direct evidence the working hypothesis that the two states of sleep (slow wave sleep and paradoxical sleep) are dependent upon monoaminergic mechanisms. Neuropharmacological, histochemical and neurochemical technics have been used in association with our standard chronic continuous neurophysiological recordings. (Author)
AD-646 846 HC$3.00 MF$0.65

WATER TRANSFER THROUGH HUMAN SKIN.
Final technical rept.,
Washington Univ., Seattle. Dept. of Atmospheric Sciences.
Konrad J. K. Buettner, Evelyne Robbins, Jean Crichlow, Margaret Pitts, and David Jones. 1966, 7p
Contract Nonr-477 (22)

Descriptors: (*Skin, Permeability), Transport properties, Water, Sorption, Salts, Humidity.

The main purpose of this study was the investigation of the transfer function of human skin. G. E. Folk, R. E. Peary and K. Buettner discovered independently the passage of water from weak salt solutions into the human foot. This statement proved true also for hands, arms, backs, soles of man and for the non-hairy part of rabbit's ears. The transfer into the body can also be observed if air of more than 90% relative humidity, and of skin temperature covers the skin. (Author)
AD-646 848 HC$3.00 MF$0.65

ENVIRONMENTAL BIOLOGY.
Federation of American Societies for Experimental Biology, Bethesda, Md.
For primary bibliographic entry see Field 6F.
AD-646 890 MF$0.65

A GENERALIZATION OF THE MOTZKIN THEOREM.
Parke Mathematical Labs., Inc., Carlisle, Mass.
For primary bibliographic entry see Field 12B.
AD-646 926 HC$3.00 MF$0.65

SENSORY COGNITION.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
F. I. Georgiev, V. I. Dubovskoi, A. M. Korshunov, and I. B. Mikhailova. 31 Oct 66, 259p FTD-HT-66-431
TT-67-60991
Unedited rough draft trans. of mono. Chuvstvennoe Poznanie, Moscow, 1965 237p.

Descriptors: (*Sensory perception, Humans), Sense organs, Sensation (Physiology), Perception (Psychology), Images, Visual perception, Animals, Children, Language, USSR.

Gnosiological analysis was made of the basic forms of sensory cognition-sensation, perception, and ideation. One of the central topics is the problem of adequacy of sensory cognition, particularly sensations and perceptions. Sensations, perceptions, and ideas are considered to be subjective images of reality and not symbols. The character of images produced by sensory cognition is affected by conditions under which the object reflected exists, the structure and activity of the individuals sense organs, etc. The relationship of images, symbols, and signals is discussed and the relationship of images and models is elucidated. (Author)
AD-646 929 HC$3.00 MF$0.65

6Q. PROTECTIVE EQUIPMENT

A STUDY OF MILITARY IMPLICATIONS OF PROTECTIVE DEVICES DESIGNED TO PREVENT OR AMELIORATE HEAD AND NECK INJURIES.
Federation of American Societies for Experimental Biology, Washington, D. C. Life Sciences Research Office.
For primary bibliographic entry see Field 6E.
AD-646 841 HC$3.00 MF$0.65

6R. RADIOBIOLOGY

THE INDIVIDUAL SENSITIVITY OF DOGS TO RADIATION.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
N. A. Volokhava. 29 Jul 66, 12p FTD-TT-65-1997
TT-67-60789
Unedited rough draft trans. of Meditsinskaya Radiologiya (USSR), v9 n11 p40-5 1964.

Descriptors: (*Radiation effects, Dogs), Gamma rays, Radiological dosage, Radiation sickness, Responses, Cardiovascular system, Adaptation (Physiology), Mortality rates, Hematology, Body temperature, Life span, Radiobiology.
Identifiers: Radiosensitivity.

Differences in the reactions of dogs observed during radiation effect (300 r, a generally uniform gamma irradiation in a 300-250 r dosage) confirm individual radio sensitivity. The degree of radiation effect of animals influences their initial functional state, which can be evaluated by the expressivity of responsive reactions to physical charges. Reactions of the cardiovascular system to muscular load (run) and the nature of physical thermo regulation during the overheating appear to be demonstrative. Strong dogs with well expressed adaptive reactions live longer than weaker dogs after striking irradiation effect in a dosage of 300 r. (Author)
AD-646 451 HC$3.00 MF$0.65

PROGRAM 63IA. VOLUME VI. EXPERIMENT D 8: RADIATION IN SPACECRAFT.
Air Force Weapons Lab., Kirtland AFB, N. Mex.
For primary bibliographic entry see Field 22A.
AD-646 555 HC$3.00 MF$0.65

A NOTE ON THE GALACTIC RADIATION EXPOSURE IN GEOMAGNETICALLY UNPROTECTED REGIONS OF SPACE.
Joint rept.,
Naval Aerospace Medical Inst., Pensacola, Fla.
Hermann J. Schaefer. 28 Oct 66, 22p NAMI-982
NAVMED-MF022.03.02-5001-36
Research supported in part by NASA.

Descriptors: (*Space environmental conditions, *Radiation hazards), (*Galaxies, Radiation hazards), Solar radiation, Terrestrial magnetism, Radiobiology, Space medicine.

Measurements of the galactic flux at low rigidities during the Years of the Quiet Sun 1964-65 indicate that the galactic radiation is still modulated at solar minimum with the differential flux at low rigidities strongly depressed. Thus it is assumed that, in space systems of low shielding, no exceptionally large skin doses in a human target will result. This is quite different from that occurring from trapped radiation and solar particle beams. A conservative estimate for the total dose from galactic radiation at solar minimum including secondaries for 2pi incidence is 50 millirads/24 hours with 5 to 8 per cent of this dose produced by high LET components. If life shortening is used as criterion for long-term effects, the quoted exposure corresponds to a factor of 0.2 in the sense that 100 days of exposure would shorten the residual life span by 20 days. (Author)
AD-646 583 HC$3.00 MF$0.65

FOREIGN SCIENCE BULLETIN VOL. 3, NO. 1, 1967.
Library of Congress, Washington, D. C. Aerospace Technology Div.
For primary bibliographic entry see Field 5A.
AD-646 634 HC$3.00 MF$0.65

METALBOLIC CHANGES IN HUMANS FOLLOWING TOTAL-BODY IRRADIATION.
Summary rept., Feb 60- 30 Apr 66,
Cincinnati Univ., Ohio. College of Medicine.
Eugene L. Saenger, Ben I. Friedman, James G. Kereiakes, and Harold Perry. 1 Sep 66, 174p
DASA-1844
Contract DA-49-145-XZ-315

Descriptors: (*Whole body irradiation, Humans), (*Metabolism, Whole body irradiation), Partial body irradiation, Military personnel, Radiation effects, Chromosomes, Immunology, Hematology, Biochemistry, Psychology, Statistical analysis, Radiobiology.

This report summarizes the data accumulated from fifty patients who have been given total or partial body irradiation at the University of Cincinnati

Medical Center from February 1960 through April 1966. Psychological, hematological, metabolic, immunological and chromosomal findings are statistically analyzed and some implications concerning reduction in combat effectiveness of military personnel exposed to ionizing radiation are drawn.
AD-646 667 HC$3.00 MF$0.65

ACUTE ULTRASTRUCTURAL EFFECTS OF 500 ROENTGENS ON THE LYMPH NODE OF THE MOUSE.
Armed Forces Inst. of Pathology, Washington, D. C.
Edward B. Smith, David C. White, Robert J. Hartsock, and Arthur C. Dixon. 25 Jul 66, 17p
Prepared for presentation in part at the Annual Meeting of the American Association of Pathologists and Bacteriologists (63rd), Cleveland, Ohio, March 1966. Prepared in cooperation with VA and Michigan Univ. Ann Arbor, Dept. of Pathology.
Availability: Published in The American Journal of Pathology v50 n1 p159-74 Jan 1967.

Descriptors: (*Lymphatic system, *Radiation effects), Lymphocytes, Whole body irradiation, X rays, Cell structure, Pathology, Mitochondria, Nuclei (Biology), Cytoplasm, Mice.
Identifiers: Cell membrane, Cell vacuole.

The ultrastructural alterations in lymph node lymphocytes and histiocytes in the mouse during the first 6 hours after 500 r whole-body irradiation are described. A half hour after irradiation, histiocytes exhibited prominent pseudopodia particularly enlarged when near damaged lymphocytes. Damaged lymphocytes showed aggregation of chromatin near the nuclear membranes, smudged and abnormally electron-dense mitochondria, and a tendency to widening of the perinuclear space with separation of the nucleus and cytoplasm. At 1 hour histiocyte pseudopodia became more prominent and changes in the lymphocytes included disarray of RNP particles. Three hours after irradiation chromatin in lymphocyte nuclei had condensed at the nuclear membrane and the center of the nucleus was electron-lucent. Focal sectors of separation between nucleus and cytoplasm occurred in the obviously damaged cells. Histiocyte pseudopodia lay in contact with damaged and apparently dying lymphocytes. In some instances, pyknotic nuclei or whole cells with pyknotic nuclei appeared within phagocytic vacuoles in histiocytes as early as 3 hours after irradiation. At 6 hours many dense, shrunken, and fragmented nuclei as well as membranous remnants of cytoplasmic organelles were noted within phagocytic vacuoles in histiocytes. Some of these remnants could be identified as mitochondria whereas other debris was unidentifiable. (Author)
AD-646 683 Not available from CFSTI.

ON THE DEVELOPMENT OF X-RAY INJURIES TO THE SKIN.
K Voprosu O Razvitii Rentgenovskikh Porazheniy Kozhi
National Aeronautics and Space Administration, Washington, D. C.
L. A. Afrikanova. Dec 66, 8p NASA-TT-F-10630
Transl. Into English From The Book "trudy Vsesoyuznoy Konferentsii Patologo- Anatomoy" Leningrad, 1956 P 332-337

Descriptors: *Radiation sickness, *Skin (biol), *X-ray irradiation, Animal study, Energy, Exposure, Injury, Irradiation, Pathology, Process, Radiation, Sickness, Vessel, Wall, X-ray.

For abstract, see STAR 05 06.
N67-15550 HC$3.00 MF$0.65

CHANGES IN THE PERIPHERAL DIVISION OF THE AUDITORY ANALYZER IN ACUTE RADIATION SICKNESS.
Izmeneniye Perifericheskogo Otdela Slukhovogo Analizatora Pri Ostroy Luchevoy Bolezni
National Aeronautics and Space Administration, Washington, D. C.
M. YA. Kozlov. Oct 66, 11p NASA-TT-F-10361
Transl. Into English From Vestn. Otorinolaringol. (Moscow), V. 20, No. 2, 1958 P 29-35

Descriptors: *Auditory perception, *Radiation sickness, Analyzer, Auditory, Bioelectricity, Cochlea, Division, Evaluation, Guinea pig, Hearing, Irradiation, Perception, Periphery, Radiation, Sickness, X-ray.

For abstract, see STAR 05 06.
N67-15553 HC$3.00 MF$0.65

STUDIES OF HEAVILY IONIZING PARTICLES AND SPACE BIOLOGY SEMIANNUAL REPORT.
California Univ., Berkeley. Lawrence Radiation Lab.
For primary bibliographic entry see Field 6E.
For abstract, see STAR 05 06.
N67-15941 HC$3.00 MF$0.65

A COMPUTER PROGRAM FOR THE ANALYSIS OF GAMMA-RAY SPECTRA BY THE METHOD OF LEAST SQUARES.
Public Health Service, Washington, D. C. Div. of Radiological Health.
Charles R. Phillips, Jon A. Stewart, and T. Whit Athey, III. Aug 66, 32p
PHS-999-RH-21

Descriptors: (*Computer programs, *Gamma-ray spectra), Analysis, Environmental tests, Computers, Computer storage devices, Radiation monitors, Radiological contamination, Least squares method.

A computer program, written in Fortran II and Fortran IV languages for the IBM 1620 and 7040-1401 computers, respectively, is presented for the analysis of gamma-ray spectra by the method of least squares. The Fortran IV main program and four subroutines are included in appendices. The method is accurate, agreeing favorably with estimated standard deviations, and is sufficiently sensitive to be useful for routine analysis of gamma-ray spectra of a substantial number of low-activity samples. Data provided by a verification experiment show that the least squares method is more accurate than the simultaneous equations method. (Author)
PB-173 978 HC$3.00 MF$0.65

EVALUATION OF STATE PROGRAMS FOR RADIATION CONTROL.
Southern Interstate Nuclear Board, Atlanta, Ga.
1 Dec 64, 124p
TID-22793
Contract AT-49-1-2595

Descriptors: (*Radiological contamination, *Management control systems), Statistical analysis, Health physics instrumentation, Water pollution, Air pollution, Radiation hazards.

The report contains a list of the agencies in each SINB state having regulatory responsibilities in the field of radiation protection (regardless of the type of radiation in each instance herein), together with complete information as to: The scope and extent of authority of each agency; The scope of each agency's program; A description of the organization of each agency, including administrative line of authority; and A description of advisory boards and committees, and how and when they are utilized. Personnel requirements for a radiation protection program is summarized to permit the SINB states to assume those regulatory responsibilities which the Commission can discontinue and the states can assume pursuant to Section 274 of the Atomic Energy Act. (Author)
PB-174 050 HC$3.00 MF$0.65

BIOLOGICAL EFFECTS OF IONIZING RADIATION. AN ANNOTATED BIBLIOGRAPHY COVERING THE YEARS 1898-1957,
Rochester Univ., N. Y. Atomic Energy Project.
Marylou Ingram. Dec 66, 900p
Contract AT (30-1)-875

Descriptors: (*Radiobiology, Bibliographies), Abstracts, Documentation.

For abstract, see NSA 21 04.
TID-3097 (Abstract) HC$3.00 MF$0.65

BIOLOGICAL EFFECTS OF IONIZING RADIATION, AN ANNOTATED BIBLIOGRAPHY COVERING THE YEARS 1898-1957,
Rochester Univ., N. Y. Atomic Energy Project.
Marylou Ingram. Dec 66, 293p
Contract AT (30-1)-875

Descriptors: (*Radiobiology, Bibliographies), Indexes, Documentation.

For abstract, see NSA 21 04.
TID-3097 (Index) HC$3.00 MF$0.65

6S. STRESS PHYSIOLOGY

RESPIRATORY FUNCTION IN NORMAL YOUNG ADULTS AT 3475 AND 4300 METERS.
Rept. for Oct 64-Feb 65,
Army Medical Research and Nutrition Lab., Denver, Colo.
C. Frank Consolazio, Herman L. Johnson, LeRoy O. Matoush, Richard A. Nelson, and Gerhard J. Isaac. 5 Jan 67, 32p USAMRNL-300

Descriptors: (*Respiration, High altitude), Physical fitness, Pressure breathing, Exercise, Lungs, Volume, Adaptation (Physiology), Stress (Physiology).

The respiratory function of two groups of normal, young adults were studied at altitudes of 3475 and 4300 meters for 21 and 28 days, respectively. In the 4300 meter study, physical conditioning in one-half of the subjects proved to be beneficial since it resulted in an additional increase in Maximal breathing capacity (MBC) during high altitude exposure. This suggests that physical conditioning may be a factor in assessing a superior physical condition at altitude. Maximal breath holding times, at altitude, were also significantly increased with physical conditioning. For the combined groups, the MBC were all significantly increased at high altitude, which was not apparent in the sea level group. This may have been due to the decreased work of breathing the rarefied air at altitude. Maximal breath holding times were significantly decreased for all groups during high altitude exposure, and forced vital capacities (FVCs) in general were decreased at altitude. The sea level controls showed no changes in MBC, FVC, and maximal breath holding time during the entire study. (Author)
AD-646 461 HC$3.00 MF$0.65

THE RELATIONSHIP OF SCUBA DIVING TO THE DEVELOPMENT OF AVIATORS' DECOMPRESSION SICKNESS.
Research rept.,
Naval Medical Research Inst., Bethesda, Md.
Donald E. Furry, Elizabeth Reeves, and Ed. Beckman. Dec 66, 17p
NAVMED-MF011.99-1001-5

Descriptors: (*Decompression sickness, Flight crews), (*Aviation medicine, Decompression sickness), Breathing apparatus, Scuba divers, Compressed air, Diving, Aviation personnel, Medical research.

No additional decrease in ambient pressure which occurs when a compressed air diver flies in an aircraft within a short time after diving may be sufficient to precipitate decompression sickness, even though the dive itself was in accordance with the U. S. Navy decompression tables. The current practice by both military and civilian divers of using air transportation after compressed air diving suggests the need for specific instructions regarding the decompression required before flying after diving. In order to quantitate the importance of this problem, an experiment was designed in which large dogs were exposed to compressed air for 7 hours at their 'no-bends' pressure threshold as determined after the method of Reeves and Beckman. After pressurization, the animals were decompressed within 2-3 minutes to sea level. A sea level decompression interval of 1, 3, 6, or 12 hours was given prior to further decompression to a simulated altitude of 10,000 feet. The incidence of decompression sickness at altitude was 92.9% for the 1 hour surface decompression interval, 30% for the 3 hour interval, 27.8% for the 6 hour interval and 0% for the 12 hour interval. From these large animal studies it may be postulated that a surface decompression interval of at least 12 hours should be allowed before flying after compressed air diving of a depth and duration to require the use of diving tables.
AD-646 494 HC$3.00 MF$0.65

PROCEEDINGS OF THE ANNUAL CONFERENCE ON ATMOSPHERIC CONTAMINATION IN CONFINED SPACES (2ND), 4 AND 5 MAY 1966.
Aerojet-General Corp., Dayton, Ohio. Toxic Hazard Research Unit.
Dec 66, 326p
AMRL-TR-66-120
Contract AF 33 (657)-11305
See also AD-629 622.

Descriptors: (*Toxicity, Medical research), (*Oxygen consumption, Toxicity), (*Space medicine, Oxygen consumption), Hazards, Contamination, Spacecraft cabins, Atmosphere, Pressure breathing, Space simulation chambers.

This report is a complete compilation of the papers presented and the Proceedings of the 2nd Annual Conference on Atmospheric Contamination in Confined Spaces, sponsored by the Aerospace Medical Research Laboratories and held in Dayton, Ohio on 4 and 5 May 1966. Major technical areas discussed by the invited speakers, members of the Open Forum, and Conference attendees included toxicology of space cabin materials, comparative toxicology and pathology of oxygen, and the effects of oxygen on contaminant toxicity.
AD-646 512 HC$3.00 MF$0.65

FINAL REPORT, 1 JULY 1961-1 JULY 1966.
Pennsylvania Univ., Philadelphia. Lab. of Pharmacology.
For primary bibliographic entry see Field 6T.
AD-646 556 HC$3.00 MF$0.65

KINEMATICS NOMENCLATURE FOR PHYSIOLOGICAL ACCELERATIONS WITH SPECIAL REFERENCE TO VESTIBULAR APPLICATIONS.
Naval Aerospace Medical Inst., Pensacola, Fla.
W. Carroll Hixson, Forrest L. Niven, and Manning J. Correia. 8 Aug 66, 101p Monograph-14
NAVMED-MR005.04-0021

Descriptors: (*Acceleration, *Vestibular apparatus), Kinematics, Vocabulary, Mathematical analysis, Responses, Stimulation, Nystagmus, Semicircular canals, Physiology.

A mathematical nomenclature in the language of kinematics was formulated to provide precise, man-referenced identifications of the real accelerations comprising the basic vestibular stimuli and of certain selected vestibular response measures. The system is based on establishing anatomical landmarks in the form of three mutually orthogonal cardinal head axes and planes to which the magnitude and direction characteristics of both the acceleration stimuli and the vestibular responses can be referenced. Notation is provided to describe separately the resultant linear acceleration and the resultant angular acceleration arising in any force environment in terms of their components acting along and about, respectively, the three cardinal axes. The notation and application format of the nomenclature has application in the general acceleration physiology field as well as the vestibular area. (Author)
AD-646 581 HC$3.00 MF$0.65

NUTRITIONAL EVALUATION OF A PRECOOKED DEHYDRATED AND BITE-SIZED COMPRESSED FOOD DIET AS SOLE SOURCE OF NUTRIMENT FOR SIX WEEKS.
Miami Valley Hospital, Dayton, Ohio. Dept. of Research.
For primary bibliographic entry see Field 6H.
AD-646 642 HC$3.00 MF$0.65

CATECHOLAMINES, HYPOXIA AND THE METABOLIC RESPONSE TO COLD IN NEWBORN RABBITS,
Army Research Inst. of Environmental Medicine, Natick, Mass.
C. M. Blatteis. 1966, 6p
Availability: Published in Biometeorology II, Proceedings of the International Congress (3rd), Pau, France, Sep 1-7 1963, p365-70.

Descriptors: (*Heat production (Biology), *Levarterenol), (*Hypoxia, Cold weather tests), Exposure, Metabolism, Oxygen consumption, Amines, Temperature, Adaptation (Physiology), Responses, Rabbits.

Experiments were conducted to test the hypothesis that the hypoxic depression of the metabolic response to cold in newborn rabbits is due to the inhibition by hypoxia of the calorigenic action of noradrenaline. It was found that in a cold hypoxic environment, the increase of the rate of oxygen consumption following noradrenaline (and other amines) was reduced, but not suppressed, when compared with the response in a neutral thermal environment in air. Thus, the role of catecholamines in the thermogenic response to cold and its depression by hypoxia is not a simple relationship. (Author)
AD-646 698 Not available from CFSTI.

PHYSIOLOGICAL IMPLICATIONS AS TO SURVIVAL DURING IMMERSION IN WATER AT 75F.
Naval Medical Research Inst., Bethesda, Md.
Edward L. Beckman, and Elizabeth Reeves. 1966, 9p
NAVMED-MF-011.99-1001.R-12
Availability: Published in Aerospace Medicine v37 n11 p1136-42 Nov 1966.

Descriptors: (*Survival, *Body temperature), Responses, Water, Temperature, Heat production (Biology), Tolerances (Physiology), Stress (Physiology), Shivering, Blood, Glucose.
Identifiers: Water immersion, Cold tolerance.

It has been determined in previously reported experiments that immersion at water temperatures of 75F (23.8C) may be limited by failure of the body's physiological compensatory mechanisms. This investigation was designed to study the physiological responses of subjects immersed to neck level in 75F water for periods up to 12 hours. Measurements relating to the body loss of heat, energy, fluids, and electrolytes were obtained. It was found that a 12 hour period of immersion could not be tolerated by all of the subjects for various reasons: (1) loss of body heat with a reduction in deep body temperature to below the predetermined limiting temperature of 95F, (2) extreme discomfort with muscle cramps following prolonged shivering, and (3) decrease in blood glucose to levels below the predetermined limiting value of 60 mg per cent. The changes in blood morphology, blood electrolytes, oxygen utilization and urinary excretion during the period of immersion, in addition to the physiological changes which caused the termination of some experiments are directly related to tolerance of immersion. It was also found that some subjects experienced a significant adrenocortical stress response with subsequent adrenocortical insufficiency. These factors are of importance in survival from the involuntary immersion associated with disasters at sea. (Author)
AD-646 826 Not available from CFSTI.

PHYSIOLOGICAL RESPONSES OF PILOTS TO SEVERE WEATHER FLYING,
Civil Aeromedical Inst., Oklahoma City, Okla.
Jess M. McKenzie, and Vincent Fiorica. Jul 66, 15p
AM-66-41

Descriptors: (*Pilots, Stress (Physiology)), Jet planes, Thunderstorms, Atmospheric motion, Responses, Physiology, Adrenal medulla hormones, Amines, Urine, Electrolytes (Physiology), Hemoglobin, Body weight.

Selected measurements of stress-related and other physiological variables were made on jet aircraft pilots participating in USWB-NSSL turbulent weather programs. Data were gathered from two categories of flying conditions: (1) storm penetration flights (Scimitar type aircraft) and (2) storm perimeter flights (Canberra type aircraft). Measurements made before and after each flight included urinary catecholamine levels, urinary electrolyte concentrations, urinary hemoglobin levels and body weight. Results indicate a direct relationship between catecholamine output during the penetration flights and the pilots' evaluation of the turbulence encountered. Increased output of catecholamines also corresponded to unusual inflight experiences during storm penetrations. No relationship between catecholamine output and instrumentally measured turbulence was detected in the Canberra aircraft. The data indicate that turbulence effects on sympathoadrenal responses are related to the pilot's evaluation of the turbulence. Stress responses to severe weather flying may be related to the pilot's previous experience and other factors which affect his assessment of the storm. (Author)
AD-646 871 HC$3.00 MF$0.65

ENVIRONMENTAL BIOLOGY.
Federation of American Societies for Experimental Biology, Bethesda, Md.
For primary bibliographic entry see Field 6F.
AD-646 890 MF$0.65

THE "BIOSPUTNIK" IS CONDUCTING INVESTIGATIONS.
Biosputnik Vodet Issledovaniya
National Aeronautics and Space Administration, Washington, D. C.
N. Gurovskiy. Nov 66, 5p NASA-TT-F-10650
Transl. into English From Aviats. I Kosmonavt. (Moscow), No. 5, 1966 P 32-34

Descriptors: *Biosatellite, *Cosmos satellite, *Inner radiation belt, *Radiation effect, Animal, Belt, Biological, Dog, Effect, Inner, Medical, Physiology, Protection, Radiation, Study, U.S.S.R.

For abstract, see STAR 05 06.
N67-15700 HC$3.00 MF$0.65

AEROSPACE MEDICINE AND BIOLOGY - A CONTINUING BIBLIOGRAPHY WITH INDEXES, NOVEMBER 1966.

National Aeronautics and Space Administration, Washington, D. C.
Dec 66. 151p NASA-SP-7011/31/

Descriptors: *Abstract, *Aerospace medicine, *Bibliography, *Biology, Biostromautics, Environment, Human, Life, Manned, Organism, Pharmacology, Physiology, Psychology, Safety, Sanitation, Space, Space flight, Support, Survival, Toxicology.

For abstract, see STAR 05 06.
N67-16554 HC$3.00 MF$0.65

6T. TOXICOLOGY

TOXIC EFFECT OF HIGH OXYGEN PRESSURES ON THE ANIMAL ORGANISM,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
I. M. Ivanov, B. D. Kraychinskii, S. I. Prikladovitskii, and V. R. Sonin. 20 Sep 66, 24p FTD-TT-65-940
TT-67-60794
Edited trans. of Fiziologicheskii Zhurnal SSSR, v17 n5 p1019-34 1934.

Descriptors: (*Oxygen, Toxicity), (*Convulsive disorders, Therapy), Poisoning, Pathology, Central nervous system, Blood transfusions, Blood chemistry, Blood, Glucose, Hypoglycemia, Anesthesia, Cerebral cortex, Pressure, Laboratory animals, USSR.

Blood transfusion from an animal subjected to compressed oxygen and showing a series of convulsive seizures did not produce an oxygen poisoning syndrome in the recipient in the small doses employed. At high oxygen pressures an increase in blood sugar is observed which is associated with an intensified muscular activity during the seizures. Thus, the hypothesis of a hypoglycemic character of the convulsions in oxygen poisoning must be discarded. In decerebrated animals (in which the thalamus opticus has not been removed) convulsive seizures in oxygen poisoning are not observed even at 8 atm. of oxygen. It is concluded that that the site of damage of the central nervous system causing the convulsions in oxygen poisoning is the cerebral cortex. Preliminary hedonal anesthesia eliminates convulsive seizures in oxygen poisoning. The anesthesia must be sufficiently deep for this purpose. With a short exposure, the anesthesia produces a favorable outcome. Although the use of hedonal eliminates the seizures, it does not warrant an appreciable extension of the exposure, since a sufficiently prolonged action of compressed oxygen will inevitably produce acute inflammatory manifestations in the lungs causing death. In all cases, hedonal post-anesthesia stops seizures observed after removal from the chamber. However, the outcome of the oxygen poisoning depends on the magnitude of oxygen pressure and on the exposure, the species, and the individual resistance of the experimental animal. At 8 atm. pressure, the outcome is unfavorable, since the seizures recur after prolonged sleep and result in death. (Author)
AD-646 498 HC$3.00 MF$0.65

PROCEEDINGS OF THE ANNUAL CONFERENCE ON ATMOSPHERIC CONTAMINATION IN CONFINED SPACES (2ND), 4 AND 5 MAY 1966.
Aerojet-General Corp., Dayton, Ohio. Toxic Hazard Research Unit.
For primary bibliographic entry see Field 6S.
AD-646 512 HC$3.00 MF$0.65

FINAL REPORT, 1 JULY 1961-1 JULY 1966.
Pennsylvania Univ., Philadelphia. Lab. of Pharmacology.
C. J. Lambertsen. 1 Jul 66, 20p
Contract Nonr-551 (14)
Rept. on proj. Oxygen Toxicity.
Descriptors: (*Life support, Oxygen), (*Oxygen, Toxicity), (*Respiration, Oxygen), (*Blood circulation, Oxygen), Hypoxia, Poisoning, Toxic tolerances, Lungs, Central nervous system, High-pressure research, Blood chemistry, Transport properties, Helium, Chemoreceptors, Carbon dioxide, Decompression, Submarines, Underwater vehicles.

A summary is given of studies concerning oxygen toxicity, with special reference to the effects of oxygen at increased ambient pressures on respiration and circulation in man. Topics include: oxygen tolerance; pulmonary oxygen toxicity in man; physiological (non-toxic) effects of oxygen upon the lung; narcosis by high pressures of helium; studies of respiratory control; studies of decompression; open sea activities; laboratory and pressure chamber development; pulmonary and CNS tolerance of normal men at rest to 100% oxygen breathing at various levels of ambient pressure.
AD-646 556 HC$3.00 MF$0.65

SOME STATISTICAL TREATMENTS COMPATIBLE WITH INDIVIDUAL ORGANISM METHODOLOGY.
Army Medical Research Lab., Fort Knox, Ky. Biophysics Div.
For primary bibliographic entry see Field 6C.
AD-646 751 HC$3.00 MF$0.65

TOXICOLOGIC EVALUATION OF 2,2'- (9-10-ANTHRYLENEDIMETHYLENE) -BIS-2-PSEUDOTHIOUREA DIHYDROCHLORIDE DIHYDRATE (NSC-56054).
Mason Research Inst., Worcester, Mass.
For primary bibliographic entry see Field 6O.
PB-173 976 HC$3.00 MF$0.65

ADDENDUM TO TOXICOLOGIC EVALUATION OF TOXICOLOGIC 2,2'- (9,10-ANTHRYLENEDIMETHYLENE) - BIS - 2 - PSEUDOTHIOUREA DIHYDROCHLORIDE DIHYDRATE (NSC-56054).
Mason Research Inst., Worcester, Mass.
For primary bibliographic entry see Field 6O.
PB-173 977 HC$3.00 MF$0.65

ACUTE ORAL ADMINISTRATION OF CFNU TO RHESUS MONKEYS,
Hazelton Labs., Inc., Falls Church, Va.
For primary bibliographic entry see Field 6O.
PB-173 979 HC$3.00 MF$0.65

ACUTE IP ADMINISTRATION OF SODIUM FLUOROACETATE TO MALE ALBINO RATS; PROTECTION BY MONACETIN AGAINST LETHALITY OF SODIUM FLUOROACETATE AND 3-CYCLOHEXYL-1- (2-FLUOROETHYL)-1-NITROSOUREA (CFNU) TO MALE ALBINO RATS.
Hazleton Labs., Inc., Falls Church, Va.
For primary bibliographic entry see Field 6O.
PB-173 980 HC$3.00 MF$0.65

ACUTE ORAL ADMINISTRATION OF CYTOSINE ARABINOSIDE TRIACETATE TO MALE ALBINO RATS AND MALE AND FEMALE RHESUS MONKEYS,
Hazleton Labs., Inc., Falls Church, Va.
For primary bibliographic entry see Field 6O.
PB-173 981 HC$3.00 MF$0.65

6U. WEAPON EFFECTS

APPROACH TO THE EVALUATION OF TOXIC HAZARDS FROM WEAPONS EXHAUST IN ARMED HELICOPTERS,
Army Aeromedical Research Unit, Fort Rucker, Ala.
G. L. Hody. Nov 66, 21p USAARU-67-5

Descriptors: (*Weapon systems, Exhaust gases), (*Exhaust gases, Toxicity), Hazards, Helicopters, Poisonous gases, Carbon monoxide, Performance (Human), Confined environments, Contamination.

The complexity of flying and the environmental stresses encountered by pilots of armed helicopters are continuing challenges. Under such difficult conditions any interference with mental or sensory capabilities of the pilots can be reflected in an increased casualty rate. Helicopter mounted weapons release a toxic exhaust which could disturb vision and hearing and might adversely affect reaction time and the reasoning process. A brief exploratory study confirmed the impression that the weapons exhaust can reach the crew in measurable concentrations. An objective assessment of the hazard is obviously needed before costly or inconvenient corrective measures need be considered. A careful search failed to reveal existing methods for the required evaluation which involves continuous measurement of rapidly changing contaminant concentrations in a confined and vibrating environment. An experimental program designed to explore a technique for meeting the operational requirement is being implemented in cooperation with the Air Force Rocket Propulsion Laboratory. While the potential for a hazardous situation is very real in all armed aircraft, the concern is with the new, experimental helicopters, equipped with multiple rapid fire weapons systems, in addition to those armed helicopters now deployed in the field. (Author)
AD-646 587 HC$3.00 MF$0.65

7. CHEMISTRY

7A. CHEMICAL ENGINEERING

A THEORETICAL ANALYSIS OF EXTENSIVE AIR SHOWERS. I. NEAR-VERTICAL SHOWERS AT SEA LEVEL,
Durham Univ. (England). Dept. of Physics.
J. F. de Beer, B. Holyoak, J. Wdowczyk, and A. W. Wolfendale. 12 Jul 66, 22p
AFOSR-67-0261
Contract AF 61 (052)-929
Availability: Published in Proceedings of the Physical Society v89 p567-85 1966.

Descriptors: (*Cosmic ray bursts, Interactions), Theory, Nucleons, Air, Nuclei, Pions, Protons, Decay schemes, Mathematical models, Muons, Distribution, Great Britain.

Calculations were made of some features of extensive air showers expected in the near-vertical direction at sea level for three models for the nucleon-air-nucleus, and pion-air-nucleus interaction. The models were chosen with regard to known experimental features of interactions of energy up to some few thousand GeV and the calculations have been made for primary protons and heavy nuclei, the latter using a simple fragmentation model. Detailed comparison between prediction and experiment has been made for the energy spectrum and lateral density distribution of muons in showers of size in the region of 1,000,000 particles. All the models predict the measured shape of the energy spectrum to several hundred GeV, indicating that the propagation model and the energy spectrum adopted for all three models are acceptable. (Author)
AD-646 924 Not available from CFSTI.

CHEMICAL ENGINEERING DIVISION SEMI-ANNUAL REPORT, JULY-DECEMBER 1965.
Argonne National Lab., Ill.
May 66, 246p
Contract W-31-109-eng-38

Descriptors: (*Chemical engineering, Fluidized bed processes), Energy conversion, Thermodynamics, Reactor materials, Reactor safety systems.

For abstract, see NSA 21 04.
ANL-7125 HC$3.00 MF$0.65

NUCLEAR DESALINATION DUAL-PURPOSE PLANT CONTROL STUDIES.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 04.
ORNL-TM-1618 Part 1 HC$3.00 MF$0.65

ESTIMATION OF INTERIM REPLACEMENT COSTS OF DUAL-PURPOSE NUCLEAR-ELECTRIC SEA WATER CONVERSION STATIONS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18E.
ORNL-TM-994 HC$3.00 MF$0.65

7B. INORGANIC CHEMISTRY

HIGH PRESSURE SYNTHESIS OF ARSENOPYRITE-TYPE TERNARY COMPOUNDS,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Mario D. Banus, and Mary C. Lavine. 5 Jul 66. 11p
Research supported in part by USAF.
Availability: Published in Materials Research Bulletin v1 n1 p3-12 1966.

Descriptors: (*Osmium compounds, Synthesis (Chemistry)), (*Ruthenium compounds, Synthesis (Chemistry)), (*Tellurides, Synthesis (Chemistry)), (*Selenides, Synthesis (Chemistry)), Antimony compounds, Bismuth compounds, High-pressure research, Vapor pressure, Compressive properties, Stability, Crystal structure, Phase studies, Semiconductors.
Identifiers: Osmium antimony selenide, Osmium antimony telluride, Osmium bismuth selenide, Ruthenium bismuth selenide.

A series of ternary compounds analogous to FeAsS (arsenopyrite) have been prepared at atmospheric pressure by Hulliger and others. They were able to synthesize only 20 of the possible 36 isoelectronic compounds with the general formula MXY, where M is Fe, Ru or Os; X is P, As, Sb or Bi; Y is S, Se or Te. Four of the missing compounds (OsSbSe, OsSbTe, OsBiSe and RuBiSe) have now been synthesized in a tetrahedral anvil high-pressure unit at 35-50 kbar. The role of high pressure is discussed in relation to vapor pressure of the elements, size ratio and compressibility of the atoms, and stability of the phases. The X-ray powder patterns of OsSbSe, OsSbTe and OsBiSe have been indexed as monoclinic structures of the same type adopted by Hulliger and the lattice parameters are also consistent. Resistivity measurements on OsSbSe and OsSbTe suggest that they are extrinsic semiconductors. (Author)
AD-646 477 Not available from CFSTI.

THE ENTHALPIES OF FORMATION OF Rb (+) AND Cs (+) IONS IN INFINITELY DILUTE AQUEOUS SOLUTIONS,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 7D.
AD-646 586 HC$3.00 MF$0.65

CRYSTAL CHEMISTRY STUDIES.
Quarterly rept. no. 6, 14 Aug-13 Nov 66.
Pennsylvania State Univ., University Park. Materials Research Lab.
Rustum Roy, G. J. McCarthy, O. Muller, and W. B. White. Feb 67. 13p
ECOM-01304-6
Contract DA-28-043-AMC-01304 (E)
See also AD-640 952.

Descriptors: (*Crystals, Chemical properties), (*Rare earth compounds, Crystals), (*Rhenium compounds, Crystals), (*Europium compounds, Phase studies), (*Oxides, Phase studies), Crystal structure, Manganese compounds, Chromium compounds, Titanium compounds, Titanates, Phase diagrams, Synthesis (Chemistry), Dissociation.
Identifiers: Chromic oxide, Erbium rhenium oxides, Europium oxides, Europium titanium oxides, Manganese dioxide, Titanium oxides.

Additional data were obtained on the lanthanide-rhenium compounds and the space group of the Er2ReO5 type compound was determined. Work on the divalent oxide-Cr2O3-O system at high oxygen pressure continued. Work was started on the system MnO2-CrO2. Investigations were made on the Eu2O3-TiO2, Eu2O3-Ti2O3, and EuO-TiO joins in the Eu-Ti-O system. The A-phase was identified as a monoclinic Eu2TiO5. EuTiO3 is shown to have an extremely wide range of stability and is the only Eu (++) compound in much of the system. The join EuO-TiO is shown not to be binary and compositions along this join dissociate into EuTiO3 and a new oxygen-rich metal phase. (Author)
AD-646 603 HC$3.00 MF$0.65

SOLVENT EXTRACTION STUDY OF METAL FLUOROACETYLACETONATES.
Interim rept., 10 Sep 65-9 Sep 66.
Monsanto Research Corp., Dayton, Ohio.
William G. Scribner, and Mary F. Borchers. Sep 66. 113p
ARL-66-0192
Contract AF 33 (615)-1093

Descriptors: (*Solvent extraction, *Acetones), (*Chelate compounds, Solvent extraction), Halogenated hydrocarbons, Fluorine compounds, Organic solvents, Iron, Copper, Beryllium, Zinc, Cobalt, Aluminum, Chromium, Calcium, Toxicity, Ketones, Synthesis (Chemistry), Gas chromatography.
Identifiers: Hexafluoro acetylacetones, Trifluoro acetylacetones.

Results of a program to study the solvent extraction properties of trifluoroacetylacetone and hexafluoroacetylacetone are described. Log distribution-pH curves are presented for the extraction of iron (III), copper, beryllium, zinc, and cobalt with benzene-hexafluoroacetylacetone and with chloroform-hexafluoroacetylacetone; for the extraction of beryllium with benzene, chloroform, and toluene containing trifluoroacetylacetone; for the extraction of copper, cobalt, and beryllium with butanol-trifluoroacetylacetone; and for the extraction of chromium (III) with toluene-trifluoroacetylacetone. A survey of various solvent systems for the extraction of calcium with trifluoroacetylacetone and hexafluoroacetylacetone is also presented. For most systems, equilibration time studies and anion interference studies are described to aid in the establishment of analytically useful procedures. Acute toxicity studies on trifluoroacetylacetone and 2,2,6,6-tetramethylheptane-3,5-dione are described and permit the assignment of the rating 'toxic' to trifluoroacetylacetone and 'not toxic' to the other beta-diketone. (Author)
AD-646 607 HC$3.00 MF$0.65

BASIC RESEARCH ON SYNTHESIS OF NEW PHOSPHORUS-NITROGEN REAGENTS.
Interim rept. 15 Nov 64-15 Nov 65.
Monsanto Research Corp., Dayton, Ohio.
Morris L. Nielsen. Jan 66. 28p
ARL-66-0003
Contract AF 33 (615)-2218

Descriptors: (*Complex compounds, Synthesis), (*Phosphorus compounds, Synthesis), (*Nitrogen compounds, Synthesis), Metals, Gravimetric analysis.
Identifiers: Imidodiphosphates.

Two compounds of the general formula (RO)2P-ONHP-O(OR)2 were prepared and applied in the preparation of metal derivatives. Tetraethyl imidodiphosphate and tetraphenyl imidodiphosphate were prepared by published methods. New crystalline derivatives were obtained for the first compound with zinc, for the second compound with zinc, palladium, lanthanum, cerium, praseodymium and europium. A tetramminepalladium (II) derivative of tetraphenyl imidodiphosphate is promising for the gravimetric determination of palladium. (Author)
AD-646 745 HC$3.00 MF$0.65

KINETICS OF HYDROGEN-OXYGEN AND HYDROCARBON-OXYGEN REACTIONS.
Hull Univ. (England). Dept. of Chemistry.
For primary bibliographic entry see Field 7D.
AD-646 850 HC$3.00 MF$0.65

THE SOLUBILITIES OF SELECTED ELEMENTS IN LIQUID PLUTONIUM. IX. VANADIUM,
Los Alamos Scientific Lab., N. Mex.
D. F. Bowersox, and J. A. Leary. 15 Sep 66. 12p
Contract W-7405-eng-36

Descriptors: (*Liquid metals, Plutonium), (*Vanadium, Liquid metals), Solubility, Containment, Reactor operation.

For abstract, see NSA 21 04.
LA-3594 HC$3.00 MF$0.65

TWO THREE-METAL CHEMICAL COMPOUNDS (NA K HG2 AND NA CD HG).
Ueber Zwei Chemische Verbindungen Dreier Metalle Unter Sich (Nakhg2 Und Nacdhg)
National Aeronautics and Space Administration, Washington, D. C.
E. Jaenecke. Dec 66. 5p NASA-TT-F-10444
Transl. Into English From Z. Physik. Chem. (Frankfurt), V. 57, 1907 P 507-510

Descriptors: *Chemical compound, *Metal compound, *Ternary system, Cadmium, Chemical, Composition, Compound, Cooling, Melting, Mercury, Metal, Potassium, Sodium, Solidification, System, Temperature, Ternary.

For abstract, see STAR 05 06.
N67-15557 HC$3.00 MF$0.65

INTERACTION BETWEEN CARBIDES OF TRANSITION METALS AND THEIR OXIDES.
Vzaimodeystviye Karbidov Perekhodnykh Metallov S Ikh Okislami
National Aeronautics and Space Administration, Washington, D. C.
V. B. Fedorus, and T. YA. Kosolapova. Dec 66. 10p NASA-TT-F-10447
Transl. Into English From Izv. Akad. Nauk Sssr, Ser. Neorganicheskiye Materialy (Ussr), V. 2, No. 8, 1966 P 1516-1523

Descriptors: *Chemical reaction, *Molecular interaction, *Transition element, Alloy, Atom, Carbide, Chemical, Chromium, Electron, Element, Hafnium, Interaction, Metal, Molecular, Molybdenum, Niobium, Oxide, Reaction, Structure, Titanium, Transition, Vanadium, Zirconium.

For abstract, see STAR 05 06.
N67-15690 HC$3.00 MF$0.65

EXISTENCE ET STRUCTURE DES MONOCARBURES DE TERRES RARES: ETUDE DE LEURS PROPRIETES MAGNETIQUES A BASSES TEM-

PERATURES (Existence and Structure of Rare-Earth Monocarbides: Study of their Low Temperature Magnetic Properties).
Doctoral thesis in French,
Commissariat a l'Energie Atomique Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
Robert Lallement. 21 Mar 66, 65p CEA-R-3043
Text in French, attached summary in English.

Descriptors: (*Rare earth compounds, *Carbides), (*Ferromagnetic materials, Rare earth compounds), Crystal structure, Thermal stability, Magnetic properties, Anisotropy, Low-temperature research, Ions, Band theory of solids, Electrical conductance, Transition temperature, Phase diagrams, X-ray diffraction analysis, Neutron diffraction analysis, Thermoelectricity, Crystal substructure, France.

There are two types of rare earth carbides, the first one is face-centered cubic, stable at high temperature and very hypostoechiometric (formula MCx with $0,35 < x < 0,65$); the other one is rhomboedric, stable at lower temperature, with a formula M2C. These two carbides are magnetically ordered at low temperatures (ferro or ferri-magnetism). They are highly anisotropic. A great part of the electrical and magnetic properties can be explained from the following ideas: (a) the M (3+) ions are coupled via the conduction electrons, (b) there are more conduction electrons in the carbides than in the metals, (c) there is some local order around the transition temperatures. (Author)
PB-174 030 HC$3.00 MF$0.65

7C. ORGANIC CHEMISTRY

FUNDAMENTAL CHEMISTRY OF ORGANOTIN COMPOUNDS.
Final rept. 1 Oct 62-31 Jul 65,
Polytechnic Inst. of Brooklyn, N. Y.
Ernest I. Becker. 31 Jul 65, 3p
AROD-3767:3
Contract DA-31-124-ARO (D)-29

Descriptors: (*Metalorganic compounds, *Tin compounds), Hydrides, Aromatic compounds, Chemical reactions.
Identifiers: Triphenyltin hydride.

Brief discussion of progress on an investigation of the chemistry of organotin compounds.
AD-474 501 HC$3.00 MF$0.65

AROMATIC OXIDATION BY ELECTRON TRANSFER. III. OXIDATION OF 1-AND 2-METHOXY-NAPHTHALENE BY MANGANIC ACETATE.
Interim rept.,
Texas Univ., Austin. Dept. of Chemistry.
Peter J. Andrulis, Jr., and Michael J. S. Dewar.
31 May 66, 6p
AFOSR-67-0243
Grant AF-AFOSR-1050-66
See also AD-646 330.
Availability: Published in Journal of the American Chemical Society v88 n23 p5483-5 Dec 5 1966.

Descriptors: (*Aromatic compounds, Oxidation), (*Naphthalenes, Oxidation), (*Ethers, Oxidation), Phenyl ethers, Oxidation-reduction reactions, Oxidizers, Manganese compounds, Acetates, Acetic acids, Quinones, Reaction kinetics.
Identifiers: Manganic acetate, Methyl naphthylethers, Electron transfer.

Kinetic studies of the oxidations of 1- and 2-methoxynaphthalene by manganic acetate in acetic acid are reported. Both reactions follow the kinetic scheme established for the analogous oxidation of p-methoxytoluene, indicating that the first step involves the reversible abstraction of an electron from the aromatic substrate by MnIII. The products of oxidation at low conversions were 4-methoxy-1-napthyl acetate and 2-methoxy-1,4-naphthoquinone, respectively. (Author)
AD-646 362 Not available from CFSTI.

SYNTHESIS ON THE BASIS OF ORGANIC DERIVATIVES OF MERCURY,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
V. A. Nefedov, and M. N. Nefedova. 29 Aug 66, 13p FTD-HT-66-478
TT-67-60769
Unedited rough draft trans. of Zhurnal Obshchei Khimii (USSR), v36 n1 p122-6 1966.

Descriptors: (*Metalorganic compounds, *Mercury compounds), (*Ferrocenes, Synthesis (Chemistry)), Substitution reactions, Exchange reactions, Phenyl ethers, Halides, Thiocyanates, Imides, Ethers, Organic sulfur compounds, Copper compounds, USSR.

By the exchange of a mercury group for an anion of copper salt from mercurized ferrocenes there were obtained halide-, rhodano-, acetoxy-, and phthalimindo-ferrocenes. The substitution of halide in bromoferrocenes for the phenoxy group was accomplished. A number of sulfur derivatives of ferrocene were obtained. (Author)
AD-646 374 HC$3.00 MF$0.65

HALOMETHYL-METAL COMPOUNDS. VII. THE REACTION OF PHENYL (BROMODICHLOROMETHYL) MERCURY WITH CARBOXYLIC ACIDS.
Interim rept.,
Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
Dietmar Seyferth, and Jeffrey Yick-Pui Mui. 24 Jun 66, 7p
AFOSR-67-0049
Grant AF-AFOSR-502-66
See also AD-646 416.
Availability: Published in Journal of the American Chemical Society v88 n20 p4672-6 Oct 20 1966.

Descriptors: (*Metalorganic compounds, *Mercury compounds), (*Halogenated hydrocarbons, Metalorganic compounds), (*Carboxylic acids, Chemical reactions), Bromine compounds, Chlorine compounds, Esters, Synthesis (Chemistry), Decomposition, Alkenes, Reaction kinetics, Acetates.
Identifiers: Carbenes, Dichloro methylenes, Mercurials, Phenyl (Bromo dichloromethyl) Mercury.

Phenyl (bromodichloromethyl) mercury reacts with carboxylic acids in benzene at 80C to give high yields of phenylmercuric bromide and dichloromethyl esters, RCOOCCl2H! With trichloroacetic acid phenyl-mercury cleavage becomes an important side reaction. Evidence is presented that it is the monomeric RCOOH (not the hydrogen-bonded dimer) which is the reactive species. A mechanism in which the carboxylic acid reacts with dichlorocarbene released by mercurial decomposition is favored. (Author)
AD-646 394 Not available from CFSTI.

THE 'SIZE' OF A LONE PAIR OF ELECTRONS. EVIDENCE FOR AN AXIAL t-BUTYL GROUP,
Notre Dame Univ., Ind. Dept. of Chemistry.
Ernest L. Eliel, and M. Carmeline Knoeber. 24 Sep 66, 5p
AFOSR-67-0023
Grants AF-AFOSR-772-65, NSF-GP-2096
Availability: Published in Journal of the American Chemical Society v88 n22 p5347-9 Nov 20 1966.

Descriptors: (*Molecular orbitals, Measurement), (*Stereochemistry, *O-heterocyclic compounds), Monocyclic compounds, Molecular isomerism, Chemical equilibrium, Free energy, Nuclear magnetic resonance.
Identifiers: Butyl dioxanes, Molecular conformations.

Evidence is presented indicating that the space requirements of a free pair of electrons are much smaller than those of a bonded hydrogen atom. The evidence is based on cis-2-alkyl-5-t-butyl-1, 3-dioxanes existing very largely in the conformation in which the t-butyl group is axial. Apparently his is the first instance where a t-butyl group is found to assume the axial position in a six-membered ring system. (Author)
AD-646 402 Not available from CFSTI.

HALOMETHYL-METAL COMPOUNDS. VI. PHENYL (DIHALOMETHYL) MERCURY COMPOUNDS: THEIR PREPARATION AND SOME CLEAVAGE REACTIONS.
Interim rept.,
Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
Dietmar Seyferth, and Harry D. Simmons, Jr. 11 Feb 66, 13p
AFOSR-67-0111
Grant AF-AFOSR-502-66
See also AD-634 581.
Availability: Published in Journal of Organometallic Chemistry v6 p306-15 1966.

Descriptors: (*Metalorganic compounds, *Mercury compounds), (*Halogenated hydrocarbons, Metalorganic compounds), Bromine compounds, Chlorine compounds, Iodine compounds, Synthesis (Chemistry), Substitution reactions, Decomposition, Spectra (Infrared), Nuclear magnetic resonance.
Identifiers: Phenyl mercurials, Mercurials.

Phenyl (dibromomethyl)mercury, phenyl (bromochloromethyl) mercury, phenyl (dichloromethyl)-mercury, phenyl (bromoiodomethyl) mercury, phenyl (chloroiodomethyl) mercury and phenyl (diiodomethyl) mercury were prepared by the reaction of phenylmercuric chloride with the appropriate dihalomethane and potassium tert-butoxide in toluene solution. Phenyl (chloroiodomethyl) mercury is more readily accessible by the reaction of phenyl (bromochloromethyl) mercury with one molar equivalent of sodium iodide in methanol/benzene medium. The action of an excess of sodium iodide on C6H5HgCHX2 (X=Cl or Br) resulted in formation of phenyl (diiodomethyl) mercury. Methanolic hydrogen bromide and bromine in carbon tetrachloride cleave first a phenyl group from phenyl (dihalomethyl) mercurials, giving CHX2HgBr compounds, but an excess of these reagents causes complete cleavage of organic groups from mercury. The IR and NMR spectra of these mercurials are presented and their significant features are discussed. (Author)
AD-646 416 Not available from CFSTI.

ION RADICALS. XI. THE REACTIONS OF THIOXANTHENE AND THIOXANTHENE 10-OXIDE IN SULFURIC ACID,
Texas Technological Coll., Lubbock. Dept. of Chemistry.
H. J. Shine, and L. Hughes. 25 Apr 66, 17p
AFOSR-67-0022
Grant AF-AFOSR-975-66
See also AD-646 121.
Availability: Published in Journal of Organic Chemistry v31 p3142-6 Oct 1966.

Descriptors: (*Free radicals, Chemical reactions), (*S-heterocyclic compounds, Free radicals), Polycyclic compounds, Oxides, Sulfoxides, Sulfuric acid, Spectra (Visible + ultraviolet), Nuclear magnetic resonance, Ions, Decomposition, Ketones.
Identifiers: Thioxanthenes, Thioxanthene oxides.

Thioxanthene in 96% sulfuric acid is converted partly into the thioxanthylium ion and partly into a sulfonated thioxanthylium ion. The products obtained from this solution were thioxanthene, thioxanthone, and a thioxanthene-sulfonic acid. Solutions of thioxanthene 10-oxide in 96% sulfuric acid

had the same ultraviolet, visible, and nmr spectra as solutions of thioxanthylium perchlorate in 96% sulfuric acid. The products obtained from the thioxanthene 10-oxide solution were thioxanthene and thioxanthone. These data show that the 10-oxide is converted cleanly into the thioxanthylium ion in 96% sulfuric acid. This conversion also occurs in 80% sulfuric acid and was followed by the change in the ultraviolet spectrum of the solution. Dithioxanthyl undergoes oxidative scission in 96% sulfuric acid. The thioxanthylium ion is formed. Oxidative scission occurs also under treatment with bromine in carbon tetrachloride, and thioxanthylium perbromide was isolated in almost quantitative yield. In none of the work was it possible to detect the thioxanthene cation radical. (Author)
AD-646 422 Not available from CFSTI.

HETEROCHAIN HIGH-MOLECULAR COMPOUNDS. COLLECTION OF ARTICLES: SELECTED ARTICLES.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 11I.
AD-646 447 HC$3.00 MF$0.65

A BORON-PERMETHYL CLOSO-CARBORANE; H2C2B5 (CH3)5.
Technical rept.,
Space-General Corp., Los Angeles, Calif. Center for Research and Education.
H. V. Seklemian, and Robert E. Williams. 17 Jan 67, 9p TR-11, SGC-482-11
Contract Nonr-4381 (00)

Descriptors: (*Organoboranes, Synthesis (Chemistry)), Boranes, Pyrolysis, Alkylation, Molecular structure, Mass spectrum, Nuclear magnetic resonance, Spectra (Infrared), Polymers.
Identifiers: Carboranes.

A report is given of the synthesis of the first boron-permethyl closo-carborane, H2C2B5 (CH3)5, a derivative of closo-2,4-dicarbaheptaborane in which all of the borons--and only the borons--are methylated. This compound was prepared by copyrolysis of nido-2,3-dicarbahexaborane and boron trimethyl at 300C. Interest in this and related compounds stems from their potential uses as precursors of thermally stable polymers.
AD-646 576 HC$3.00 MF$0.65

SOLVENT EXTRACTION STUDY OF METAL FLUOROACETYLACETONATES.
Monsanto Research Corp., Dayton, Ohio.
For primary bibliographic entry see Field 7B.
AD-646 607 HC$3.00 MF$0.65

THE REACTION OF MOLECULES IN EXCITED ELECTRONIC STATES WITH PARAMAGNETIC GASES.
Texas Univ., Austin. Dept. of Chemistry.
For primary bibliographic entry see Field 7E.
AD-646 673 HC$3.00 MF$0.65

EFFECTS OF HIGH PRESSURES ON THE PHOSPHORESCENCE OF AROMATIC HYDROCARBONS.
California Univ., Santa Barbara. Dept. of Chemistry.
For primary bibliographic entry see Field 7D.
AD-646 739 HC$3.00 MF$0.65

BASIC RESEARCH ON SYNTHESIS OF NEW PHOSPHORUS-NITROGEN REAGENTS.
Monsanto Research Corp., Dayton, Ohio.
For primary bibliographic entry see Field 7B.
AD-646 745 HC$3.00 MF$0.65

ELECTROPHILIC SUBSTITUTION AT SATURATED CARBON. XXVII. CARBANIONS AS INTERMEDIATES IN THE BASE-CATALYZED METHYLENE-ASOMETHINE REARRANGEMENT,
California Univ., Los Angeles. Dept. of Chemistry.
Donald J. Cram, and Robert D. Guthrie. 15 Aug 66, 9p Contrib-1932
AFOSR-67-0360
Grant AF-AFOSR-124-65
See also AD-639 079.
Availability: Published in Journal of the American Chemical Society v88 n24 p5760-5 Dec 20 1966.

Descriptors: (*Substitution reactions, *Stereochemistry), (*Amines, Substitution reactions), Hydrogen, Deuterium, Ions, Carbon, Exchange reactions, Reaction kinetics.
Identifiers: Dichloro phenylmethylene phenylethylamine, Methylbenzylidene dichloro benzhydrylamine.

The base-catalyzed methylene-azomethine rearrangement was studied in the di-p-chlorophenylmethylene-alpha-phenylamine (I) and N- (alpha-methylbenzylidene) -p,p' -dichlorobenzhydrylamine (II) systems in dioxane-ethylene glycol-O-d (potassium ethylene glycoxide) and in t-butyl alcohol-O-d (potassium t-butoxide). At equilibrium in t-butyl alcohol, I/II was about unity at 75 degrees. In the rearrangement of I to II in ethylene glycol-O-d2 at low conversion, recovered I showed no loss in optical activity and no deuterium incorporation. In the rearrangement of II to I at low conversion in both media, recovered II showed high deuterium incorporation. The latter fact excludes the concerted (one-stage) mechanism for prototropy advanced over 2 decades ago for the methylene-azomethine rearrangement in similar systems. The data are consistent with a mechanism that involves formation of an azaallylic anion which is protonated much faster at the benzhydryl than at the benzyl position. Such a mechanism brings into conformity the base-catalyzed methylene-azomethine and the allylic rearrangement of olefins. (Author)
AD-646 805 Not available from CFSTI.

KINETICS OF HYDROGEN-OXYGEN AND HYDROCARBON-OXYGEN REACTIONS.
Hull Univ. (England). Dept. of Chemistry.
For primary bibliographic entry see Field 7D.
AD-646 850 HC$3.00 MF$0.65

COMPARISON OF CHEMICAL EXCHANGE RATES DETERMINED BY NMR LINE-SHAPE AND EQUILIBRATION METHODS: INTERNAL ROTATION OF N-METHYL-N-BENZYLFORMAMIDE,
Illinois Univ., Urbana. Dept. of Chemistry and Chemical Engineering.
For primary bibliographic entry see Field 7D.
AD-646 873 Not available from CFSTI.

CONFORMATION ISOMERIZATION OF HEXAHYDRO-1,3,5-TRIMETHYL-1,3,5-TRIAZINE.
Technical rept.,
Illinois Univ., Urbana. Dept. of Chemistry and Chemical Engineering.
H. S. Gutowsky, and Piero A. Temussi. 17 Jan 67, 17p TR-3
Contracts Nonr-1834 (13), N00014-66-C0010-A04
Prepared for publication in Journal of American Chemical Soc.

Descriptors: (*Triazines, Molecular isomerism), (*Stereochemistry, Triazines), Free energy, Heat of activation? Spectroscopy, Thermochemistry.
Identifiers: Hexahydro trimethyl triazine, Molecular conformations.

The H high-resolution spectrum of hexahydro-1,3,5-trimethyl-1,3,5-triazine was observed at temperatures from -58 to +42C. The rate of conformational isomerization was determined by a complete line-shape analysis method over the temperature range-26 to +42C. From these rates, the activation parameters were determined to be 15.2 plus or minus 0.2 and 13.2 plus or minus 0.2 kcal/mole and 7.5 eu, respectively, at the coalescence temperature of 268.1K. It is proposed that the mechanism of conformational isomerization involves inversion of the ring in synchronism with inversion of one or two of the nitrogen atoms, followed or proceeded by a fast inversion of the other nitrogens. s-Trioxane and 2,4,6-hexamethyl-1,3,5-trithiane (HMTT) were studied also. The isomerization rate of s-trioxane proved to be too fast for measurement and that of HMTT too fast for a complete study. However, spin-echo measurements of the latter gave an approximate value of 8 kcal/mole for the free energy of activation. (Author)
AD-646 902 HC$3.00 MF$0.65

7D. PHYSICAL CHEMISTRY

TIME TO EXPLOSION FOR AN EXPLOSIVE SUBJECTED EXTERNALLY TO ELEVATED TEMPERATURES.
Technical rept.,
Picatinny Arsenal, Dover, N. J. Feltman Research Labs.
Fred P. Stein. Mar 65, 41p
PA-TR-3167

Descriptors: (*Heat of activation, RDX), (*Reaction kinetics, *Heat of activation), Mathematical models, Thermal conductivity, Lead compounds, Azides, Density, Explosive materials.

The most important knowledge required in the calculation of time to explosion for an explosive subjected to an elevated temperature is the kinetics of thermal decomposition of the explosive. This study of models used in computing times to explosion showed that activation energy, frequency factor, type of kinetic expression, and their interrelationships transcend in importance all other physical and chemical properties of the explosive. Two mathematical models which describe heat conduction in an explosive accompanied by simultaneous internal generation of heat from thermal decomposition of the explosive were studied. The boundary and initial conditions for one model were such that an infinite slab of explosive of finite thickness, initially at a constant temperature, was suddenly exposed to a constant temperature on its lower surface while its upper surface was perfectly insulated. Zinn and Mader's correlation of the solutions to this problem (REF 8) was used in the study of this model. The other model was that of a semiinfinite solid initially at a constant temperature which suddenly has its surface exposed to an elevated constant temperature. G. B. Cook's correlation of the solutions to this model (REF 2) was studied. Both models used zero-order kinetics to describe predetonation decomposition. (Author)
AD-459 649 HC$3.00

A BIBLIOGRAPHY OF REFERENCES FOR THE THERMOPHYSICAL PROPERTIES OF HELIUM-4, HYDROGEN, DEUTERIUM, HYDROGEN DEUTERIDE, NEON, ARGON, NITROGEN, OXYGEN, CARBON DIOXIDE, METHANE, ETHANE, KRYPTON, AND REFRIGERANTS 13, 14, AND 23.
National Bureau of Standards, Boulder, Colo.
For primary bibliographic entry see Field 20M.
AD-467 519 HC$3.00 MF$0.65

A 56-MOMENT SYSTEM OF DIFFERENTIAL KINETIC EQUATIONS,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 20M.
AD-646 375 HC$3.00 MF$0.65

DETECTION OF ROSIN, ROSIN DERIVATIVES, AND PHENOLIC RESIN MODIFICATIONS IN ALKYD COATINGS USING ULTRAVIOLET SPECTROPHOTOMETRY.
Army Coating and Chemical Lab., Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 11C.
AD-646 383 HC$3.00 MF$0.65

MAGNETIC FIELD DEPENDENCE OF THE KNIGHT SHIFT.
Battelle Memorial Inst., Columbus, Ohio. Columbus Labs.
For primary bibliographic entry see Field 20L.
AD-646 396 Not available from CFSTI.

ALTERNATE-GRADIENT FOCUSING OF MOLECULAR BEAMS.
Chicago Univ., Ill. Inst. for the Study of Metals.
For primary bibliographic entry see Field 20G.
AD-646 406 Not available from CFSTI.

MILLIMETER ELECTRON PARAMAGNETIC RESONANCE IN STRONTIUM TITANATE.
Syracuse Univ., N. Y. Dept. of Physics.
For primary bibliographic entry see Field 20L.
AD-646 439 HC$3.00 MF$0.65

THE ELECTROCHEMICAL AND DISSOLUTION PROPERTIES OF NICKEL OXIDE.
Technical rept.,
Western Reserve Univ., Cleveland, Ohio. Dept. of Chemistry.
Alan Riga, Robert Greef, and Ernest Yeager. 1 Dec 66, 169p TR-2
Contract Nonr-1439 (09)

Descriptors: (*Single crystals, Nickel compounds), (*Nickel compounds, *Electrochemistry), Solutions, Oxides, Hydrochloric acid, Sulfuric acid, Voltage, Electrolytes, Lithium, Oxidation-reduction reactions, Reaction kinetics, Electrolytic cells, Microstructure, Etched crystals, Mass transfer, Crystal structure.
Identifiers: Nickelous oxide.

The dissolution of lithiated single crystal nickel oxide was studied in HCl and H2SO4 as functions of potential, temperature, time, and lithium content with in situ photomicrographic examination of the dissolving surface. This research indicates that the dissolution rate is extremely low even at elevated temperatures in concentrated acids and increases very rapidly (by at least several fold) over a narrow range of potentials as the potential is adjusted to more anodic values. The potential region of rapid transition corresponds to a prominent peak in the linear sweep voltammetry curves as well as in the a.c. capacity versus potential curves and correlates with the potential assigned by Pourbaix to the Ni (II)/Ni (III) couple for the nickel oxide-water system. In HCl the dissolution increases much more slowly with increasing adodic potential. Some evidence exists that the logarithm of the dissolution rate is linearly dependent on potential and has the same slope both below and above the rapid transition region. The steady state surface topography at potentials anodic to the rapid transition region is characterized by well formed etch pits, while at more cathodic potentials, no etch pits are evident even after prolonged dissolution. The dissolution kinetics are interpretated in terms of a quantitative model according to which the rate-determining step is the transfer of nickel ions over a potential energy barrier from the oxide to the Helmholtz plane in the solution phase. (Author)
AD-646 456 HC$3.00 MF$0.65

GESTALTSAUSSAGEN UBER DISSOZIIERTE UND ANDERE CHEMISCH REAGIERENDE ZWEISTOFFGRENZCHICHTEN (Concepts Concerning Dissociating and Other Chemically Reacting Binary Boundary Layers),
Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, eV., Freiburg im Breisgau (West Germany).
For primary bibliographic entry see Field 20D.
AD-646 474 Not available from CFSTI.

ELECTRON RECOMBINATION IN LASER-PRODUCED HYDROGEN PLASMA.
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
For primary bibliographic entry see Field 20I.
AD-646 476 Not available from CFSTI.

STIMULATED BRILLOUIN AND RAMAN SCATTERING IN QUARTZ AT 2.1 TO 293 KELVIN,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
For primary bibliographic entry see Field 20B.
AD-646 489 Not available from CFSTI.

WORK FUNCTION CHANGES DUE TO THE CHEMISORPTION OF WATER AND OXYGEN ON ALUMINUM,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
E. E. Huber, Jr., and C. T. Kirk, Jr. 26 May 66, 19p
Supported by U. S. Air Force.
Availability: Published in Surface Science v5 p447-65 1966.

Descriptors: (*Chemisorption, Work functions), (*Aluminum, Chemisorption), Oxygen, Water vapor, Monomolecular films, Dissociation, Chemical bonds, Reaction kinetics, Dipole moments, Oxides, Electrochemistry.
Identifiers: Oxide films, Surface chemistry.

On exposure to dry oxygen the work function of aluminum is observed to decrease with increasing fractional monolayer coverage reaching a minumum value of about 0.05 V below the fresh surface value at monolayer coverage before increasing with further oxygen exposure. This unusual insensitivity of the work function to oxygen coverage is explained on the basis of a two-site chemisorption model involving dissociation of the O2 on adjoining sites and a place exchange of one of the oxygen aoms with an underlying aluminum atom. The initial oxygen kinetics are consistent with either a homogeneous model or a heterogeneous model of activated chemisorption, but the latter model is favored as the correct explanation. Water vapor lowers the work function of both the fresh surface and an oxygen exposed surface about 1 eV. The 1 eV lowering is consistent with the polar nature of water assuming either H2O or OH groups chemisorbed on the metal oxide surface with the hydrogen outward. Microbalance and work function data indicate that water initially reacts with a fresh metal surface to produce a monolayer of oxide before forming the hydrogen outward dipole layer. (Author)
AD-646 492 Not available from CFSTI.

LIGHT SCATTERING BY LIQUIDS AND MOLECULAR SOLIDS.
California Univ., Santa Barbara. Dept. of Physics.
For primary bibliographic entry see Field 20F.
AD-646 515 HC$3.00 MF$0.65

DEGREE AND RATE OF CROSSLINKING OF CROSS LINKED POLYETHYLENE.
Dainichi-Nippon Cables Ltd., Amagasaki (Japan).
For primary bibliographic entry see Field 11I.
AD-646 531 HC$3.00 MF$0.65

SOLUTION POLYMERIZED BUTADIENE/STYRENE RUBBERS FOR WIRE AND CABLE APPLICATIONS,
Phillips Petroleum Co., Akron, Ohio. Rubber Chemicals Div.
For primary bibliographic entry see Field 11J.
AD-646 535 HC$3.00 MF$0.65

A STUDY OF SHOCK WAVE INDUCED REACTIONS.
General Electric Co., Schenectady, N. Y. Research and Development Center.
For primary bibliographic entry see Field 21B.
AD-646 559 HC$3.00 MF$0.65

EFFECT OF INORGANIC SALTS ON PYROLYSIS OF WOOD, ALPHA-CELLULOSE, AND LIGNIN DETERMINED BY DYNAMIC THERMOGRAVIMETRY.
Forest Products Lab., Madison, Wis.
For primary bibliographic entry see Field 11L.
AD-646 562 HC$3.00 MF$0.65

QUARTERLY PROGRESS REPORT NO. 63 OF SOLID-STATE AND MOLECULAR THEORY GROUP.
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 20J.
AD-646 582 HC$3.00 MF$0.65

THE ENTHALPIES OF FORMATION OF Rb (+) AND Cs (+) IONS IN INFINITELY DILUTE AQUEOUS SOLUTIONS.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
A. F. Vorobev, N. A. Ibragim, and S. M. Skuratov. 31 Oct 66, 13p FTD-HT-66-555
TT-67-60855
Eitalpii Obrazovaniya Ionov Rb+ i Cs+ Beskonechno Razbavlennykh Vodnykh Rastvorakh, unedited rough draft trans. of Moscow Univ. Vestnik. Seriya 2: Khimiya (USSR), v20 n5 p3-7 1965.

Descriptors: (*Rubidium, Heat of formation), (*Cesium, Heat of formation), (*Thermochemistry, Ionization), Dissociation, Enthalpy, Rubidium compounds, Cesium compounds, Hydroxides, Concentration (Chemistry), Calorimetry, USSR.
Identifiers: Cesium hydroxide, Rubidium hydroxide.

The work is a part of a systematic investigations of the thermochemistry of ionic compounds being performed at the thermochemical laboratory of the Moscow State University. The enthalpies of formation of rubidium and cesium compounds are best determined via the enthalpies of formation of the Rb (+) and Cs (+) ions. Enthalpies of reactions of metallic rubidium and cesium with water and enthalpies of dilution of rubidium and cesium hydroxides were determined experimentally. A vacuum apparatus was used to prepare high purity metal samples and to pour them into the ampoules employed in the calorimetric measurements. An air-tight low-heat-value calorimeter was employed. The data obtained permitted the calculation of the enthalpy of formation of RbOH and CsOH in infinitely dilute solutions, and thus permitted the determination of the standard enthalpies of formation of the Rb (+) and Cs (+) ions. (Author)
AD-646 586 HC$3.00 MF$0.65

MEASUREMENT OF GAS DENSITY BY ELECTRON SCATTERING.
Technical rept., 18 Oct 63-30 Sep 65,
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
J. W. Cunningham, and C. H. Fisher. Feb 67, 113p
AEDC-TR-66-212
Contract AF 40 (600)-1200
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Gases, Density), (*Electron beams, Scattering), Measurement, Wind tunnels, Accuracy.

It is theoretically possible to infer the density of a gas from the rate at which particles are scattered out of a beam of subatomic particles which is passed through the gas. This technique offers the possibility of a probeless density measurement which is independent of the state of the gas. Previous research verified that this technique could be implemented using a gamma ray beam, but that the best spatial resolution and measuring time which could be achieved were inadequate to allow the technique to be applied to a low density test facility. In the research reported, the technique was applied using a 50,000-v electron beam. It was found that excellent spatial resolution and measuring time could be achieved at densities as low as 6 x 10 to the -8th power gm/cc. Density profiles were measured in a low density wind tunnel with a nozzle exit diameter of 18 in. and an open jet test section. A spatial resolution of about 1 cm was achieved, and measurements required 10 sec per point. This measuring time can probably be reduced by several orders of magnitude if necessary. The densities measured were repeatable within 1 percent. Accuracy, spatial resolution, and measuring time are found to be interrelated. The constraint on the combination is discussed in detail. The design of equipment is discussed. (Author)
AD-646 590 HC$3.00 MF$0.65

ON THE STRUCTURE OF THE BBGKY HIERARCHY FOR A BOLTZMANN GAS.
Princeton Univ., N. J. Plasma Physics Lab.
R. Goldman, and E. A. Frieman. Jan 67, 21p PP-LAF-14
Contract AF 49 (638)-1555
See also AD-636 528.

Descriptors: (*Statistical mechanics, *Gases), (*Kinetic theory, Gases), Distribution functions, Series, Iterations, N-body problem, Statistical functions, Molecular beams.
Identifiers: BBGKY hierarchy, Boltzmann gas.

The authors treat the evolution in time of a spatially uniform Boltzmann gas with no initial correlations. For the case of cut-off potentials and arbitrary initial velocity distribution functions, on using the expansion parameter nr sub o to the 3rd power, with n = particle density and r sub o = range of binary potential, they show for terms of the order (nr sub o to the 3rd power) squared and lower that the hierarchy is formally self-closing even with the inclusion of many body effects; i.e., at a given order in (nr sub o to the 3rd power), with the exception of contributions linear in the single particle distribution function of the same order, the binary correlation function which determines the kinetic behavior of the single-particle distribution function only depends on functions which are themselves fully determinable within a prescribed iteration procedure. The actual convergence of the various orders of the formal expansion is discussed for initially aribtrary velocity distributions and for linearizations around Maxwellian velocity distributions. (Author)
AD-646 594 HC$3.00 MF$0.65

SUMMARY OF THE CONFERENCE ON THE OPTICAL PROPERTIES OF AEROSOLS, 15-17 OCTOBER 1964, ONCHIOTA CONFERENCE CENTER, STERLING FOREST, TUXEDO, NEW YORK.
New York Univ., N. Y. Geophysical Sciences Lab.
For primary bibliographic entry see Field 4A.
AD-646 612 HC$3.00 MF$0.65

EFFECT OF THE MOTION OF THE NUCLEUS ON THE FINE AND HYPERFINE STRUCTURE OF TERMS.
Research translation,
American Meteorological Society, Boston, Mass.
L. Baerunaite, S. Zhyironaite, and V. K. Shugurov. Nov 66, 11p T-R-622
TT-67-60857
Contract AF 19 (628)-3880
Vliianie Dvizhenyia Yadra na Tonkuyu i Sverkhtonkuyu Strukturu Termov, trans. of Vilna Univ. Mokslo Darbai (Lithuanian SSR), n25 Mathematikos, Fizikos ir Chemijos Mokslu Serija n8 p109-15 1958.

Descriptors: (*Atomic energy levels, Hyperfine structure), (*Carbon, Atomic energy levels), Nuclei, Motion, Momentum, Operators (Mathematics), Matrix algebra, Numerical analysis, Ground state, USSR.

Formulas to allow for the effect of motion of the nucleus on the fine and hyperfine structure are derived. Numerical results, including the isotope shift in the fine structure, are given for the carbon atom in the ground configuration. (Author)
AD-646 618 HC$3.00 MF$0.65

A MOSSBAUER EFFECT STUDY OF ELECTRONIC RELAXATION IN THE PARAMAGNETIC COMPOUND: NH4 (Fe,Al1) (SO4)2. 12 H2O
Carnegie Inst. of Tech., Pittsburgh, Pa. Dept. of Physics.
For primary bibliographic entry see Field 7E.
AD-646 626 HC$3.00 MF$0.65

FINE STRUCTURE OF TERMS IN ATOMIC SPECIES OF CARBON AND NITROGEN TYPE IN THE CONFIGURATIONS 1s (2)2s2p (3) AND 1s (2)2s (2)2p (3).
Research translation,
American Meteorological Society, Boston, Mass.
V. K. Shugurov, and A. B. Bolotin. Nov 66, 11p T-R-617
TT-67-60865
Contract AF 19 (628)-3880
Tonkaya Struktura Termov Atomov Tipa Ugleroda i Azota v Konfiguratsiyakh 1s (2)2s2p3 i 1s (2)2s (2)2p3, trans. of Vilna Univ. Mokslo Darbai (Lithuanian SSR), n8 Matematikos, Fizikos ir Chemijos Mokslu Serija n5 p41-7 1956.

Descriptors: (*Atomic energy levels, Line spectrum), (*Carbon, Atomic orbitals), (*Nitrogen, Atomic orbitals), Nuclear spins, Matrix algebra, Integrals, Hartree-Fock approximation, Valence, Tables, USSR.

Expressions for the elements of the energy matrix of spin-dependent interaction are found for the configurations 1s (2)2s2p (3) and 1s (2)2s (2)2p (3) in the form of radial integrals. The fine structure of terms is obtained with allowance for the nondiagonal matrix elements. Results obtained with both analytic orbitals and with Fock numerical orbitals are given. Wherever possible, the theoretical results are compared with experimental data. (Author)
AD-646 637 HC$3.00 MF$0.65

HIGH PRESSURE AND DIELECTRIC INVESTIGATIONS OF THE ALKALINE EARTH FLUORIDES.
Boston Coll., Chestnut Hill, Mass.
For primary bibliographic entry see Field 20L.
AD-646 654 HC$3.00 MF$0.65

AN ANALYSIS OF THERMAL AND DIFFUSION EFFECTS ON DROPLET GROWTH RATES.
Interim rept.,
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
Sang-Wook Kang, and Roger C. Weatherston. Sep 66, 67p CAL-AD-1672-A-2
ARL-66-0190
Contract AF 33 (657)-8302

Descriptors: (*Drops, Reaction kinetics), Vapors, Helium group gases, Fluids, Deposition, Diffusion, Condensation, Temperature, Particle size.

The effects of thermal and diffusion limitations on growth rates and temperature history of small droplets are analyzed for a supersaturated vapor in an inert carrier gas. The growth rates are determined for the cases of constant field conditions, and changing fluid conditions due to vapor deposition on droplets. The analysis is so formulated as to describe the growth process as the droplet size increases from microscopic (free-molecular) to macroscopic (continuum). For the constant field case, closed-form solutions are obtained for the droplet temperature and growth as functions of time by expressing approximately the saturation pressure of the condensing vapor as a linear function of the temperature within moderate temperature ranges. An analysis is also made of the droplet growth and temperature increase in a changing environment. The change is caused by the depletion of the vapor concentration as a result of condensation on the droplets. Equations involving conservations of mass and energy are solved, incorporating thermal and diffusion limitations, the droplet concentration and the fluid temperature change due to liberation of the heat of condensation. (Author)
AD-646 669 HC$3.00 MF$0.65

ENERGY LEVELS AND ISOTOPE SHIFTS OF TERMS FOR EXCITED STATES OF ATOMIC SPECIES OF HELIUM TYPE.
Research trans.,
American Meteorological Society, Boston, Mass.
A. I. Kantseryavichius. Nov 66, 26p T-R-602
TT-67-60866
Contract AF 19 (628)-3880
Energeticheskie Urovni i Izotopicheskoe Smeshchenie Termov Vozbuzhdennykh Sostoiani Atomov Tipa Geliya, trans. of Akademiya Nauk Litovskoi SSR, Vilna, Trudy, Seriya B, n3 (26) p107-24 1961.

Descriptors: (*Atomic energy levels, *Helium), Isotopes, Excitation, Atomic orbitals, Integrals, Line spectrum, USSR.

The energy levels of excited states of the helium-like atomic species from He to O (6+), the mass effect and relativistic corrections to the energies of several levels, and isotope shifts of terms are determined on the basis of analytic orbitals. The multiconfiguration approximation is applied to the S terms with n = 2, 3, and the effectiveness of this technique of refinement of an orbital is examined in the determination of the aforementioned quantities. The theoretical data are compared with the available experimental data and with the analogous data of other authors. Some ideas about the accuracy of these data are presented. (Author)
AD-646 674 HC$3.00 MF$0.65

QUANTUM MECHANICAL CALCULATION OF THE HELIUM MOLECULE.
Research trans.,
American Meteorological Society, Boston, Mass.
G. N. Kachinskaya, and A. B. Bolotin. Nov 66, 8p T-R-623
TT-67-60867
Contract AF 19 (628)-3880
K Voprosu Kvantovomekhanicheskogo Raschets Molekuly Geliya, trans. of Vilna Univ. Mokslo Darbai (Lithuanian SSR), n25 Matematikos, Fizikos ir Chemijos Mokslu Ser ija n8 p121-5 1958.

Descriptors: (*Atomic orbitals, *Helium), Atomic energy levels, Ground state, Excitation, Molecular association, Wave functions, Chemical bonds, USSR.

On the basis of the localized pairs method, two configurations of the helium molecule are treated: one is composed of atoms in the ground state, and the other is composed of one ground-state and one excited atom. In the first case, the dependence of the repulsive potential of the two atoms on the internuclear distance permits the conclusion that

one atom cannot come closer than 2 Bohr radii to the other. In the second case, the investigation shows that the helium molecule can be relatively stable if one atom is in the ground state and the other is in an excited state. This stable state corresponds to a binding energy of -23.4 kcal/mol and an internuclear distance D = 4 Bohr radii. (Author)
AD-646 675 HC$3.00 MF$0.65

HELICAL PATH ELECTROPHORESIS IN VERTICAL FLUID SHEATHS,
California Univ., Los Angeles. Dept. of Biophysics and Nuclear Medicine.
For primary bibliographic entry see Field 6A.
AD-646 689 Not available from CFSTI.

USE OF THIN-LAYER CHROMATOGRAPHY (TLC) FOR IDENTIFICATION OF AIRCRAFT ENGINE OIL COMPONENTS.
Naval Research Lab., Washington, D. C.
For primary bibliographic entry see Field 11H.
AD-646 699 HC$3.00 MF$0.65

A METHOD OF PRODUCING PHOSPHORUS-CONTAINING POLYESTERS,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 11I.
AD-646 711 HC$3.00 MF$0.65

EFFECTS OF HIGH PRESSURES ON THE PHOSPHORESCENCE OF AROMATIC HYDROCARBONS.
Technical rept.,
California Univ., Santa Barbara. Dept. of Chemistry.
B. A. Baldwin, and H. W. Offen. 23 Jan 67, 30p TR-2
Contract N00014-67-A-0120-0001

Descriptors: (*Hydrocarbons, *Phosphorescence), Aromatic compounds, High-pressure research, Spectroscopy.

The phosphorescence spectra, intensities and lifetimes were measured for ten aromatic hydrocarbons, dispersed in polymethylmethacrylate, in the 0-32 kbar pressure range at 298K. It was observed that the red shift is small (200-450/cm at 32 kbar) and comparable to the red shift observed in fluorescence. The measured phosphorescence lifetime decreases montonically with increasing pressures over the 0-32 kbar range for nine of the ten aromatics. From dynamic intensity measurements at 0, 10, and 20 kbar pressure it is concluded that the natural lifetime decreases by about 30% at 20 kbar. Also, the radiationless rate constant must increase by roughly the same amount. It is concluded that pressure enhances spin-orbit interaction and the vibrational overlap factors. (Author)
AD-646 739 HC$3.00 MF$0.65

ELECTRON PARAMAGNETIC RESONANCE AND OPTICAL STUDIES OF IMPURITY IONS IN SINGLE CRYSTAL HOSTS.
Brandeis Univ., Waltham, Mass.
For primary bibliographic entry see Field 20B.
AD-646 754 Not available from CFSTI.

THE VAPOR PRESSURE OF TETRAFLUOROMETHANE FROM 86-146K.
Technical rept.,
California Univ., Los Angeles. Dept. of Chemistry.
M. Simon, C. M. Knobler, and A. G. Duncan. 30 Dec 66, 14p TR-2
Contract Nonr-4756 (05)

Descriptors: (*Halogenated hydrocarbons, Vapor pressure), Cryogenics, Low-temperature research, Heat of vaporization, Heat of sublimation.
Identifiers: Carbon tetrafluoride.

The vapor pressure of CF4 has been measured from 86-146K. The equation log p (torr) = 8.5019 - 769.89/T represents the data for the solid. Above the triple point, 89.55K, the vapor pressure is represented by the equation, log p (torr) = 6.836841 - 511.69474/ (T - 15.7744). The heat of vaporization calculated by the Clapeyron equation from the data ranges from 3.4 to 2.8 kcal/mole from the triple point to the normal boiling point, 145.12K. (Author)
AD-646 757 HC$3.00 MF$0.65

ADVANCED OXIDIZER CHEMISTRY.
Technical summary rept. 1 Jul-30 Sep 66,
IIT Research Inst., Chicago, Ill. Technology Center.
Irine J. Solomon. 18 Nov 66, 26p IITRI-C227-17
AFOSR-67-0384
Contract AF 49 (638)-1175
See also AD-640 405.

Descriptors: (*Fluoborates, Chemistry), (*Oxidizers, Chemistry), (*Oxides, Fluorides), Decomposition, Molecular structure, Reaction kinetics, Nitrogen compounds, Chemical reactions, Boron compounds, Spectroscopy.

The structure of O2BF4 and the kinetics of decomposition of O2BF4 were studied. More experiments have to be completed, but it seems certain that the structure is O2 (+)BF4 (-). The decomposition of O2BF4 is best explained by: O2BF4 (s) reversibly yields O2F (g) + BF3 (g) and 2O2F yields 2O2 + F2. The reactions of O2F2 and O4F2 with nitrogen oxides produced some interesting results, but no new compounds were isolated. Some evidence for NO2OOF was obtained, but if this compound exists, it readily decomposes to O2 and NO2F. (Author)
AD-646 779 HC$3.00 MF$0.65

THE PARABOLIC OXIDATION KINETICS OF NIOBIUM.
Doctoral thesis,
McMaster Univ., Hamilton (Ontario). Dept. of Metallurgy and Metallurgical Engineering.
W. W. Smeltzer, J. S. Sheasby, and G. R. Wallwork. 25 Apr 66, 4p
AFOSR-67-0322
Grant AF-AFOSR-515-66
Availability: Published in Journal of the Electrochemical Society v113 n12 p1255-7 1966.

Descriptors: (*Niobium, Oxidation), (*Oxidation, *Reaction kinetics), Niobium compounds, Oxides, High-temperature research, Pressure.

The rate of growth and properties of the first layer of compact gamma Nb2O5 to form are important for elucidation of the oxidation reaction for niobium. It was found impossible to maintain this oxide in contact with the metal for sufficient time in the temperature range 720-825C to make measurements of its growth rate at various oxygen pressures. This layer, which accounts for the major proportion of the oxygen uptake during the time of its formation, was found to grow at a parabolic rate by a process in which the dominant diffusing species is oxygen. The growth rate of this oxide was highly sensitive to the environmental pressure of oxygen; but it was not pervious to molecular oxygen. (Author)
AD-646 807 Not available from CFSTI.

KINETICS OF HYDROGEN-OXYGEN AND HYDROCARBON-OXYGEN REACTIONS.
Final rept., Jun 65-Oct 66,
Hull Univ. (England). Dept. of Chemistry.
R. R. Baldwin, and R. W. Walker. Oct 66, 16p
AFOSR-67-0381
Grant AF-EOAR-68-65

Descriptors: (*Hydrogen, Reaction kinetics), (*Oxygen, Reaction kinetics), (*Carbon monoxide, Reaction kinetics), (*Methane, Oxidation), (*Alkanes, Chemical reactions), (*Aldehydes, Oxidation), Computer programs, Boric acids, Great Britain.
Identifiers: Propionaldehydes, Pentanes.

The report summarizes progress made on four main topics: (a) the use of computer programmes to interpret the hydrogen-oxygen and carbon monoxide-hydrogen-oxygen reactions; (b) the oxidation of methane in slowly reacting hydrogen-oxygen mixtures; (c) the addition of neopentane to slowly reacting hydrogen-oxygen mixtures; (d) the oxidation of propionaldehyde in aged boric-acid-coated vessels. The interpretation of the results obtained and the evaluation of velocity constants from the results are discussed. (Author)
AD-646 850 HC$3.00 MF$0.65

CRITICAL SURFACE TENSION FOR SPREADING ON A LIQUID SUBSTRATE.
Interim rept.,
Naval Research Lab., Washington, D. C.
Elaine G. Shafrin, and W. A. Zisman. 17 Jan 67, 20p NRL-6488

Descriptors: (*Surface tension, *Liquids), Scattering, Alkanes, Water, Surface properties, Hydrocarbons, Chemical bonds, Adhesion.

A plot of the initial spreading pressures (F sub ba) or initial spreading coefficients (S sub ba) against the surface tensions of a homologous series of organic liquids b can be used to determine the critical surface tension for spreading on a second substrate liquid phase a. Straight-line relations are found for various homologous series. The intercept of that line with the axis of abscissas (F sub ba = 0, or S sub ba = 0) defines a value of spreading for that series. This method is advantageous because it eliminates the need for measuring (or calculating) the contact angle of lens b floating on liquid a, it can be applied to any liquid substrate, and it is applicable even when spreading does not lie within the range of surface tensions of the members of the homologous series of liquids b. The value of spreading for the water/air interface was determined in this way using several homologous series of pure hydrocarbon liquids. The lowest value found was 21.7 dynes/cm at 20C for the n-alkane series. Higher spreading values were obtained using olefins or aromatic hydrocarbons as the result of interaction between the unsaturated bond and the water surface. Since the results are analogous to those reported earlier for solid surfaces, it is concluded that the clean surface of water behaves as a low-energy surface with respect to low-polarity liquids. This result is to be expected if only dispersion forces are operative between each alkane liquid and water. (Author)
AD-646 869 HC$3.00 MF$0.65

COMPARISON OF CHEMICAL EXCHANGE RATES DETERMINED BY NMR LINE-SHAPE AND EQUILIBRATION METHODS: INTERNAL ROTATION OF N-METHYL-N-BENZYLFORMAMIDE,
Illinois Univ., Urbana. Dept. of Chemistry and Chemical Engineering.
H. S. Gutowsky, J. Jonas, and T. H. Siddall. 18 Jan 67, 22p TR-4
Contract N00014-66-C-0010-A04
Availability: Prepared for publication in Journal of American Chemical Soc.

Descriptors: (*Formamides, Reaction kinetics), Exchange reactions, Line spectrum, Nuclear magnetic resonance, Stereochemistry, Chemical bonds, Protons.
Identifiers: Benzylmethylformamide.

The rate of internal rotation about the C-N amide bond was studied in N-methyl-N-benzylformamide between 170 and 90C by an nmr complete line-shape analysis method and between 20 and -2.5C

by an equilibration technique. Exchange rates were calculated from the nmr spectra of the benzyl and formyl protons in the two rotational isomers by treating them as two separate, uncoupled, exchanging AB systems with unequal populations. The calculations for the formyl protons required inclusion of temperature dependence in the chemical shift. The equilibration studies were performed on samples in which the isomer with the methyl cis to the formyl group was concentrated by complexing the equilibrium mixture with uranyl ion and stripping it off at low temperatures. The activation parameters obtained from the nmr studies agree well with those obtained by the classical equilibration method. (Author)
AD-646 873 Not available from CFSTI.

RESEARCH DIRECTED TOWARD THE STUDY OF INFRARED TRANSMISSION THROUGH VARIOUS ATMOSPHERES.
North Carolina State Univ., Raleigh. Physical Science Research.
For primary bibliographic entry see Field 20F.
AD-646 884 HC$3.00 MF$0.65

THERMOGRAVIMETRY OF PHENOL-FORMALDEHYDE POLYCONDENSATES.
Summary rept., Jan-May 65,
Air Force Materials Lab., Wright-Patterson AFB, Ohio.
R. W. Farmer. Jan 66. 5p
AFML-TR-65-246

Descriptors: (*Phenolic plastics, Thermogravimetric analysis), Pyrolysis, Powders, Molding, Polymers, Films, Particle size, Reaction kinetics.
Identifiers: Phenol-formaldehyde resins.

For constant heating rate thermogravimetry of phenol-formaldehyde polycondensates, it proved necessary to first reduce procedural bias of kinetics. The ensuing method, limited largely by instrument accuracy and practical sample form, gave empirical kinetic parameters via two complimentary curve-fitting techniques. Close correlation with past results gave confidence to the validity of the rate parameters. Several invalid cases, such as for air pyrolysis, improper geometry or inadequate cure, were also briefly probed. (Author)
AD-646 897 HC$3.00 MF$0.65

RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Columbia Radiation Lab., New York.
For primary bibliographic entry see Field 9C.
AD-646 898 HC$3.00 MF$0.65

CONFORMATION ISOMERIZATION OF HEXAHYDRO-1,3,5-TRIMETHYL-1,3,5-TRIAZINE.
Illinois Univ., Urbana. Dept. of Chemistry and Chemical Engineering.
For primary bibliographic entry see Field 7C.
AD-646 902 HC$3.00 MF$0.65

ON THE BULK (H sub c2) AND SURFACE (H sub c3) NUCLEATION FIELDS OF STRONG COUPLING SUPERCONDUCTING ALLOYS.
Cornell Univ., Ithaca, N. Y. Lab. of Atomic and Solid State Physics.
For primary bibliographic entry see Field 20C.
AD-646 909 HC$3.00 MF$0.65

MOLECULAR BEAM SAMPLING OF UNSTABLE SPECIES FROM HIGH PRESSURE SYSTEMS.
Summary technical rept.,
Midwest Research Inst., Kansas City, Mo.
Frank T. Greene, and Thomas A. Milne. 1 Feb 67, 20p
Contract Nonr-3599 (00)

Descriptors: (*Mass spectroscopy, *Thermochemistry), (*Flames, *High-pressure research), Sampling, Molecular beams, Superaerodynamics, Nucleation, Kinetic theory, Gases.

A technique has been developed for the mass spectrometric sampling of high temperature systems at atmospheric pressure and above. The gases to be sampled are expanded as a free jet, which is collimated into a molecular beam and introduced into the ion source of a mass spectrometer. Corrections must be made for two phenomena, mass separation and nucleation, which may accompany this sampling process. It has been possible to quantitatively sample stable products and free radicals from atmospheric and low pressure flames using a water-cooled probe. Condensible species have also been sampled using a probe in thermal equilibrium with the gas. It has not, however, been possible to sample with a cold probe species which form refractory condensed phases. These negative results with condensible species are attributed to interactions of the probe with the gas prior to the expansion. (Author)
AD-646 935 HC$3.00 MF$0.65

SCANNING ELECTRON PROBE MICROANALYSIS.
Technical note.
National Bureau of Standards, Washington, D. C.
Kurt F. J. Heinrich. 3 Feb 67. 45p
Hard copy available from Superintendent of Documents, GPO Washington, D. C. 20402 $0.30.

Descriptors: (*Electron microscopy, Scanning), (*Microanalysis, Scanning), Electron beams, Quantitative analysis, Luminescence, Backscattering, Excitation, Resolution, Electron optics, Photons, Meteorites, Minerals.

The combination of electron microprobe x-ray emission spectrometry with the scanning techniques first developed for the scanning electron microscope permits using the scanning electron probe as a microscope sensitive to elemental composition. This technique is particularly useful in the many applications in which spatial distribution of one or more elements in a specimen is more important than local composition. Although oscilloscope representation of probe scanning is usually obtained by the simple technique of producing a dot of light for each arriving photon, more sophisticated scanning techniques such as expanded contrast registration and concentration mapping can provide more quantitative information. Signals other than x-rays, such as target current, electron backscatter, or cathodoluminescence may be used for image formation. Electron beam scanning can also be performed in a discontinuous fashion, so that the electron beam irradiates in succession a number of spots arranged in a square or rectangular pattern, and the number of photons registered in each position is retained in the memory of a multichannel analyzer. The application of these diverse scanning techniques is illustrated. (Author)
NBS-TN-278 HC$0.30 MF$0.65

ELECTROCHEMICAL CHARACTERIZATION OF SYSTEMS FOR SECONDARY BATTERY APPLICATION SECOND QUARTERLY REPORT, AUG. - OCT. 1966.
Whittaker Corp., San Diego, Calif. Narmco Research and Development Div.
N. K. Gupta, R. J. Radkey, A. H. Remanick, and M. Shaw. 18 Nov 66. 116p NASA-CR-72138
Contract NAS3-8509

Descriptors: *Battery, *Electrochemistry, *Voltampere characteristics, Capacity, Characterization, Charge, Current, Cyclic, Density, Discharge, Efficiency, Multiple, Peak, Secondary, Sweep, System.

For abstract, see STAR 05 06.
N67-15831 HC$3.00 MF$0.65

TABLES OF THERMIONIC PROPERTIES OF THE ELEMENTS AND COMPOUNDS.
National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.
K. Carr. 1967. 34p NASA-TM-X-52263

Descriptors: *Electric property, *Emission, *Table, *Thermionics, Absorption, Bibliography, Compound, Crystal, Dipole, Electric, Electronic, Element, Energy, Function, Liquid, Physics, Pressure, Property, Solid, Vapor, Work.

For abstract, see STAR 05 06.
N67-16043 HC$3.00 MF$0.65

DETERMINATION OF THE DIFFUSION COEFFICIENTS IN ALLOYS WITH SEVERAL PHASES.
National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, Ala.
V. T. Borisov, G. N. Dubinin, and V. M. Golikov. Oct 66. 13p NASA-TM-X-59320, RSIC-604
Center, Oct. 1966 13 P Refs Transl. Into English From Izd. Akad. Nauk Sssr, Metall. I Gornoe Delo (Moscow), No. 4, 1964 P 147-152 Jointly Supported By Army Missile Command

Descriptors: *Alloy, *Diffusion coefficient, *Phase transformation, Boundary, Chromium, Coefficient, Concentration, Diffusion, Gas, Iron, Metal, Method, Phase, Saturation, Spectral, Transformation.

For abstract, see STAR 05 06.
N67-16502 HC$3.00 MF$0.65

KINETIC THEORY OF BIMOLECULAR CHEMICAL REACTION, DIFFUSIVE DRAG, AND OTHER PROCESSES IN A GAS MIXTURE.
National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.
R. A. Hord. Feb 67. 44p NASA-TR-R-254
Contract 188-37-01-02-23

Descriptors: *Chemical reaction, *Drag, *Gas mixture, *Kinetic theory, *Molecular gas, Activation, Chemical, Collision, Diffusion, Energy, Force, Gas, Kinetic, Mixture, Molecular, Rate, Reaction, Theory, Transfer.

For abstract, see STAR 05 06.
N67-16553 HC$3.00 MF$0.65

PROGRAM OF ANALYTICAL AND EXPERIMENTAL STUDY OF POROUS METAL IONIZERS, VOLUME I SUMMARY REPORT, 5 APR. 1965 - 5 MAY 1966.
TRW Systems, Redondo Beach, Calif. Electric Propulsion Technology Dept.
For primary bibliographic entry see Field 11F.
For abstract, see STAR 05 06.
N67-16572 HC$3.00 MF$0.65

RAPID TECHNIQUE FOR LIQUID SCINTILLATION COUNTING OF CARBON-14-LABELLED BARIUM CARBONATE.
Oklahoma City Univ., Okla.
J. B. Allred. 1966. 6p NASA-CR-81342
Grant NSG-300, Contract PHS-G-AM-06673

Descriptors: *Barium compound, *Carbon 14, *Scintillation counter, Barium, Carbonate, Compound, Counter, Liquid, Particle, Preparation, Reduction, Sample, Scintillation, Size, Sonic, Time.

For abstract, see STAR 05 06.
N67-16616 HC$3.00 MF$0.65

RESEARCH ON THE MECHANISM AND KINETICS OF OXIDATION OF SILICON IN AIR SEMIANNUAL REPORT, 1 JUN. - 30 NOV. 1966.

Pennsylvania State Univ., University Park. Materials Research Lab.
F. Lukes, R. Rai, and K. Vedam. 27 Dec 66. 37p
NASA-CR-81334, SAR-3
Contract NGR-39-009-042

Descriptors: *Oxide film, *Silicon oxide, *Thin film, Air, Calculation, Ellipsometer, Film, Kinetics, Measurement, Mechanism, Oxide, Rate, Silicon, Thin.

For abstract, see STAR 05 06.
N67-16631 HC$3.00 MF$0.65

CONDENSATION OF DRY AIR ON A LIQUID HYDROGEN COOLED SURFACE IN THE PRESSURE RANGE .001 TO 10 tor (KNUDSEN NUMBER OF .0001 TO 1),
National Bureau of Standards, Boulder, Colo. Cryogenics Div.
For primary bibliographic entry see Field 20M.
PB-174 024 HC$3.00 MF$0.65

LIQUID HYDROGEN ENGINEERING INSTRUMENTATION,
National Bureau of Standards, Boulder, Colo. Cryogenics Div.
For primary bibliographic entry see Field 14B.
PB-174 025 HC$3.00 MF$0.65

PROPERTIES OF LIQUID HYDROGEN (Proprietes de l'Hydrogene Liquide),
National Bureau of Standards, Boulder, Colo. Inst. for Materials Research.
For primary bibliographic entry see Field 20M.
PB-174 026 HC$3.00 MF$0.65

DENSITY-TEMPERATURE FORMULAE FOR COEXISTING LIQUID AND VAPOR AND FOR FREEZING LIQUID PARAHYDROGEN,
National Bureau of Standards, Boulder, Colo. Cryogenics Div.
For primary bibliographic entry see Field 20M.
PB-174 027 HC$3.00 MF$0.65

CONTRIBUTION A L'ETUDE DES INTERACTIONS DE L'OXYDE DE CARBONE ET DES METAU DE TRANSITION (On the Interactions Between Carbon Monoxide and Transition Metals).
Doctoral thesis,
Commissariat a l'Engergie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
Denis Abel Degras. 23 Dec 66, 142p CEA-R-3123
Test in French, summary in English.

Descriptors: (*Carbon monoxide, *Chemisorption), (*Transition elements, Chemisorption), Adsorption, Stereochemistry, Chemical bonds, Molecular energy levels, Rayleigh waves, Entropy, Molecular association, Electron bombardment, Interactions, Ionization, Dissociation, France.
Identifiers: Desorption, Surface chemistry.

The sticking of carbon monoxide on surface atoms of transition metals is a collective phenomenon: according to the adsorption process period which is considered, this phenomenon may be formally described either by the Elovich equation or essentially from a steric point of view. The process rate depends upon the nature of the metal, the carbon monoxide pressure the temperature and the population densities of the induced and fundamental energy levels of the gas-solid bond. At least one of these induced levels tends to disappear with increasing time. For a localised adsorption and taking into account the surface Rayleigh waves, the analysis of the surface entropy yields the so-called isokinetic temperature for thermal desorption. This temperature is correlated with the cohesive energy of the metal surface atoms. Finally, it is shown that the interactions of a low energy electron beam with adsorbed molecules - reflection and energy exchange, desorption, ionization or dissociative ionization are strongly dependent on the energy levels of the gas-solid bond and the relative populations of these levels. (Author)
PB-174 035 HC$3.00 MF$0.65

COLLISION-INDUCED MIXING IN THE 5 2 P/ SUB 3/2/STATE OF RUBIDIUM AND THE 6 2 P/ SUB 3/2/STATE OF CESIUM,
California Univ., Berkeley. Lawrence Radiation Lab.
Joseph Yellin. 4 Oct 66, 15p
Contract W-7405-eng-48

Descriptors: (*Alkali metals, Vapors), Rubidium, Cesium, Light, Polarization.

For abstract, see NSA 21 04.
UCRL-17175 HC$3.00 MF$0.65

GRAPHICAL REPRESENTATIONS OF SELECTED FUNCTIONS OF INTERPLANAR SPACINGS FOR 5184 INORGANIC X-RAY POWDER DIFFRACTION PATTERNS,
California Univ., Livermore. Lawrence Radiation Lab.
Monte C. Nichols. 4 Aug 66, 11p
Contract W-7405-eng-48

Descriptors: (*X-ray diffraction analysis, Graphics), (*Minerals, X-ray diffraction analysis).

For abstract, see NSA 21 04.
UCRL-50115 HC$3.00 MF$0.65

7E. RADIO AND RADIATION CHEMISTRY

IR DETECTOR TEMPERATURE REGULATOR FOR CO VIBRALUMINESCENCE STUDIES.
Utah State Univ., Logan. Electro-Dynamics Labs.
For primary bibliographic entry see Field 20F.
AD-646 429 HC$3.00 MF$0.65

SENSITIZED LUMINESCENCE IN IRRADIATED NOBLE GAS SYSTEMS.
Final rept., 22 Oct-9 Nov 64,
Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
L. W. Sieck, and J. A. Llewellyn. Sep 66, 23p
ARL-66-0180
Prepared in cooperation with Florida State Univ., Tallahassee.

Descriptors: (*Helium group gases, *Luminescence), (*Argon, Luminescence), (*Krypton, Luminescence), Nitrogen, Oxygen, Electron bombardment, Atomic energy levels, Excitation, Quenching (Inhibition), Ultraviolet spectroscopy, Radiation chemistry, Chemiluminescence.

The report describes investigations of collision induced luminescence phenomena in high pressure argon and krypton containing trace amounts of N2 and O2 using nominal 2.5 Mev electrons as the primary energy source. High resolution spectroscopy demonstrates that the C triplet-pi state of N2 is produced by quenching of the set of argon levels corresponding to approximately 11.5 ev of excitation energy. Evidence is also presented for the occurrence of the reaction N2 (B triplet-pi-g + O2 (X triplet-Sigma-g-) to NO (A double-Sigma +) + NO (X doublet-pi). (Author)
AD-646 604 HC$3.00 MF$0.65

A MOSSBAUER EFFECT STUDY OF ELECTRONIC RELAXATION IN THE PARAMAGNETIC COMPOUND: NH4 (Fe, Al1) (SO4)2. 12 H2O
Technical rept.,
Carnegie Inst. of Tech., Pittsburgh, Pa. Dept. of Physics.
Larry E. Campbell. Sep 66, 123p TR-6
Contract Nonr-760 (20)
Doctoral thesis.

Descriptors: (*Iron compounds, *Mossbauer effect), (*Ammonium compounds, Hyperfine structure), (*Atomic energy levels, Relaxation time), Aluminum compounds, Sulfates, Gamma emission, Precession, Nuclei, Concentration (chemistry), Temperature, Deuterated compounds, Magnetic fields, Spectroscopy, Paramagnetic resonance, Doppler effect, Crystal lattices.
Identifiers: Alums, Ferri ammonium sulfate.

The Mossbauer spectra of paramagnetic ferric compounds exhibit magnetic hyperfine splittings when the electronic relaxation rates of the ferric ions are made comparable to the precession frequency of the nucleus in the hyperfine field. This was observed in ferric ammonium alum diluted in aluminum ammonium alum NH4 (Fe,Al) (SO4)2.12H2O), as a function of iron concentration, temperature, deuteration and external magnetic field. The effect was also observed in the corresponding potassium alums. The crystalline field levels of the ferric ion consists of three Kramers doublets and each doublet produces its own hyperfine pattern. In the absence of an external magnetic field, the spectrum due to the Sz = plus or minus 5/2 doublet was completely resolved, that due to the plus or minus 3/2 doublet partially resolved and that due to the plus or minus 1/2 doublet not resolved at all. Relaxation time estimates are made ranging from 4 x 10 to the -7th power sec to 6 x 10 to the -11th power sec depending on the concentration, the temperatures and the particular Kramers doublet under consideration. The magnetic field produced at the nucleus by the plus or minus 5/2 doublet was found to be -572 plus or minus 7 kgauss. The isomer shift is 0.53 plus or minus 0.1 mm/sec and the quadrupole interaction energy 1/4 (E Sq)qQ=0.055 plus or minus 0.025 mm/sec. (Author)
AD-646 626 HC$3.00 MF$0.65

CHEMILUMINESCENT MATERIALS.
Technical rept. no. 14, 1 Sep-31 Dec 66,
American Cyanamid Co., Stamford, Conn. Central Research Div.
M. M. Rauhut, L. J. Bollyky, D. R. Maulding, R. A. Clarke, and B. G. Roberts. 31 Dec 66, 85p 06-1432-25-Q14
Contract Nonr-4200 (00), ARPA Order-299
See also AD-640 694.

Descriptors: (*Lighting equipment, Chemiluminescence), (*Chemiluminescence, Materials), (*Benzoates, Chemiluminescence), Molecular structure, Solvents, Concentration (Chemistry), Additives, Temperature, Esters, Amides, Ammonium perchlorate, Emissivity, Chlorine compounds, Fluorine compounds, Anthracenes, Polycyclic compounds, Spectra (Infrared), Storage, Stability, Synthesis (Chemistry), Aldehydes, Anhydrides.
Identifiers: Bis (phenyl ethynyl) anthracenes, Oxalic anhydrides, Pyridonyl glyoxal, Trichlorophenyl oxalates.

Results from a program designed to optimize the operating characteristics of peroxyoxalate chemiluminescent systems are reported. Efforts to prepare improved chemiluminescenf oxalic acid derivatives and improved fluorescers are described. The effects of oxalate structure, fluorescer structure, and reaction variables including solvent, reactant concentrations, additives and temperature are discussed. Results of storage stability tests on component solutions are reported. (Author)
AD-646 641 HC$3.00 MF$0.65

ELECTROMAGNETIC RADIATION CHEMISTRY.
Final rept. 15 Mar 63-31 Aug 66,
Louisville Univ., Ky.
Thomas H. Crawford. 31 Aug 66, 34p
Contract DA-49-193-MD-2411

Descriptors: (*Radiation chemistry, Electromagnetic waves), (*Trypsin, Magnetic fields), (*Complex compounds, Radiation chemistry), (*Copper compounds, Magnetic properties), (*Magnetic fields, Biochemistry), Enzymes, Electron spin resonance, Reaction kinetics, Chemical bonds, Amino acids, Peptides, Molecular association, pH, Proteins.

An investigation of the interaction of the enzyme trypsin with magnetic fields was undertaken. It appears that under the conditions studied there is no detectable magnetic effect on the activity of this enzyme. ESR was used to determine structural changes which might be induced in copper II-trypsin solutions on exposure to magnetic fields of 14,000 gauss. The bonding parameter alpha square was evaluated for several amino acid, peptide and trypsin complexes with copper II ions at liquid nitrogen temperatures. The changes in the nature of the metal to ligand bonding is reflected in changing values of alpha square as the pH is varied. There appears to be a reasonable correlation between those structures proposed in the literature as determined by spectrophotometric and potentiometric techniques and the values of alpha square as determined from esr measurements. Of particular interest is the marked change in the nature of the bonding in the trypsin–copper II complex over the range pH 5-6, which suggests a notable rearrangement from primarily carboxylate bonding sites to amide and amine bonding sites. There does not appear to be any detectable change in esr parameters on exposure of trypsin-copper II samples to magnetic fields of approximately 14,000 gauss. (Author)
AD-646 645 HC$3.00 MF$0.65

INFORMAL INTERNATIONAL HOT ATOM CHEMISTRY SYMPOSIUM (3RD), PURDUE UNIVERSITY, APRIL 1 AND 2, 1966.
Interim rept.,
Purdue Univ., Lafayette, Ind. Dept. of Chemistry.
F. Schmidt-Bleek. Apr 66, 68p
AFOSR-67-0338
Grant AF-AFOSR-1031-66

Descriptors: (*Radiochemistry, Symposia), (*Recoil atoms, Symposia), Phase studies, Radioactive isotopes, Fission product activity, Carbon, Hydrocarbons, Nuclear reactions, Tritiated compounds, Abstracts.

The third informal symposium on Hot Atom Chemistry was held at Purdue University on 1-2 April 1966, sponsored in part by the Air Force Office of Scientific Research. About 100 people attended, including several from Europe, South America, and Japan. Of the 47 papers presented, one large group dealt with tritium systems, and several papers dealt with the application of recoil reactions to studies of fission yields. Other areas of interest were carbon-11 reactions in simple hydrocarbons, ionic solid systems, and atomic beam techniques. Abstracts on each paper presented are given in the report. (Author)
AD-646 657 HC$3.00 MF$0.65

THE REACTION OF MOLECULES IN EXCITED ELECTRONIC STATES WITH PARAMAGNETIC GASES.
Final rept.,
Texas Univ., Austin. Dept. of Chemistry.
W. Albert Noyes, Jr. 1966, 8p
AFOSR-67-0280
Grant AF-AFOSR-778-65

Descriptors: (*Monocyclic compounds, *Photochemistry), (*Molecular energy levels, Photochemistry), Halogenated hydrocarbons, Fluorine compounds, Cyclobutanes, Ketones, Benzenes, Benzene, Toluenes, Cycloalkenes, Excitation, Emissivity, Molecular isomerism, Photolysis, Fluorescence.

Identifiers: Hexafluoro benzenes, Hexafluoro cyclobutanones, Tropilidenes.

Work in the following areas is briefly summarized: identification of singlet and triplet states of perfluorobenzene, fluorobenzene, and perfluorocyclobutanone; photochemical isomerization of substituted cycloheptatrienes; electronic energy relaxation via isomerization in toluene; photolysis of cyclobutanes. Portions of these studies are reported in greater detail in AD-617 988 and AD-635 437.
AD-646 673 HC$3.00 MF$0.65

FLIGHT DATA AND RESULTS OF RADIOCHEMICAL ANALYSES OF FILTER SAMPLES COLLECTED DURING 1965 UNDER PROJECT STARDUST.
New York Operations Office (AEC), N. Y. Health and Safety Lab.
For primary bibliographic entry see Field 18H.
HASL-176 HC$3.00 MF$0.75

A RADIOCHEMICAL TECHNIQUE TO STUDY THE SOLVENT TRANSFER REACTION IN THE POLYMERISATION OF TETRAHYDROFURAN BY PHOSPHORUS PENTAFLUORIDE.
Explosives Research and Development Establishment, Waltham Abbey (England).
D. H. Richards, D. A. Salter, and D. Sims. 13 Jun 66, 13p ERDE-4/M/66, WAC/174/04

Descriptors: *Diethyl ether, *Furan, *Phosphorus compound, *Polymerization, Carbon 14, Chain, Compound, Diethyl, Ether, Fluoride, Pentafluoride, Phosphorus, Polymer, Radiochemistry, Reaction, Solvent, Tetrahydrofuran, Tracer, Transfer.

For abstract, see STAR 05 06.
N67-16074 HC$3.00 MF$0.65

EXISTENCE ET STRUCTURE DES MONOCARBURES DE TERRES RARES: ETUDE DE LEURS PROPRIETES MAGNETIQUES A BASSES TEMPERATURES (Existence and Structure of Rare-Earth Monocarbides: Study of their Low Temperature Magnetic Properties).
Commissariat a l'Energie Atomique Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 7B.
PB-174 030 HC$3.00 MF$0.65

8. EARTH SCIENCES AND OCEANOGRAPHY

8A. BIOLOGICAL OCEANOGRAPHY

COMPILATION OF REPRINTS.
Technical repts
Oregon State Univ., Corvallis. Dept. of Oceanography.
Nov 66, 49p TR-75, REF-66-6
Contracts Nonr-1286 (10), AT (4501)-1750
Includes TR-76 thru TR-78 and Ref-66-12 thru Ref-66-14.
Availability: Published in Various journals.

Descriptors: (*Oceanology, Scientific research), Chromium, Sea water, Chemical analysis, Marine geology, Drainage, Seismology, Chemical indicators, Pacific Ocean, Ocean currents, Hydrographic surveying, Sedimentation, Sedimentary rock, Minerals.

Content: Chromium-51 in sea water: Chemistry; Seismic reflection studies of buried channels off the Columbia River; Oxygen and phosphate as indicators for the deep intermediate waters in the northeast Pacific Ocean; Sedimentary response to hydrography in an Oregon estuary. (Author)
AD-646 466 Not available from CFSTI.

HYDROMECHANIC DESIGN OF A PROPOSED NEKTON SAMPLER.
Research and development rept.,
David Taylor Model Basin, Washington, D. C. Hydromechanics Lab.
George B. Springston, Jr. Feb 67, 45p
DTMB-2376

Descriptors: (*Samplers, Underwater equipment), Towed bodies, Aquatic animals, Design, Transducers, Towing cables, Instrumentation.

The hydromechanic design of a proposed cable-towed nekton sampler is presented. The system consists of a towed body, a double-armored towcable, and suitable handling equipment aboard ship. The towed body contains special transducers for measuring the speed, depth, and water temperature, and houses a closed-circuit television camera for observing the nekton during tow. Design calculations indicate that the body can be towed at a depth of 300 feet at 10 knots with 650 feet of 0.50-inch diameter towcable in the water. (Author)
AD-646 892 HC$3.00 MF$0.65

8B. CARTOGRAPHY

THREE-DIMENSIONAL MAP CONSTRUCTION.
Technical rept.,
Kansas Univ., Lawrence. Dept. of Geography.
George F. Jenks, and Dwight A. Brown. 1966, 9p TR-1
Contract Nonr-583 (15)
Availability: Published in Science v154 n3750 p857-64 Nov 18 1966.

Descriptors: (*Mapping, Terrain models), (*Optical equipment, Mapping), Stereoscopic display systems, Maps, Transformations, Simulation, Models (Simulations).
Identifiers: Anamorphosers.

The anamorphoser transformations discussed were all prepared by using straight slits, oriented at right angles to each other and placed so that all planes of the elements were parallel to each other. It is possible to vary these conditions in an infinite number of ways and thereby produce nonparallel transformations. (Author)
AD-646 405 Not available from CFSTI.

8C. DYNAMIC OCEANOGRAPHY

SELECTION AND DESIGN OF A BORE GENERATOR FOR THE HILO HARBOR TSUNAMI MODEL: HYDRAULIC MODEL INVESTIGATION.
Research rept.,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
C. C. Shen. Jun 65, 123p AEWES-RR-2-5
See also AD-646 501

Descriptors: (*Ocean waves, Simulators), (*Harbor models, Simulators), Floods, Tides, Generators, Bays, Hydraulic models, Selection, Design, Harbors, Ocean models.
Identifiers: Tsunamis, Hilo Harbor.

Theoretical and experimental investigations were made of the generation of a bore by the three following types of bore generator: (a) piston type, (b) gate type, and (c) pneumatic type. The analyses were based on nonlinear shallow-water theory incorporated with bore conditions. The experiments were conducted in a test flume 1 ft wide and 40 ft long. Explicit solutions were obtained for the height, duration, and length of bores generated by each type of generator. The bore heights found experimentally agreed very well with the theoretical predictions. A numerical computation of the

pneumatic chamber theory was also performed and showed remarkable agreement with test results of the pneumatic-type bore generator. A uniform slope of 3 percent was installed in the test flume to investigate the bore motion over a uniform slope. The bore transformation was found to agree with Whitham's approximate solution. The bore runup reached a height above still-water level 2.6 to 3.0 times greater than the initial height of the bore on the flat bottom. The breaking of the bore during its transformation was also studied. Due to its inexpensiveness and versatility, a pneumatic-type bore generator was recommended for use in the model of Hilo Harbor, Hawaii for investigation of tsunami-wave attack at Hilo. (Author)
AD-646 509 HC$3.00 MF$0.65

SURFACE EVALUATION AND DEFINITION (SUEDE) PROGRAM.
Final rept.,
Electro-Optical Systems, Inc., Pasadena, Calif.
R. L. Kirk. 13 Dec 66, 111p EOS-7067-F
Contract NOw-66-0509

Descriptors: (*Lasers, Airborne), (*Ocean waves, Measurement), (*Marine meteorology, Measurement), Electrooptics, Feasibility studies, Instrumentation, Reflectivity, Wind.
Identifiers: SUEDE program.

The first phase of the SUEDE program was to determine the feasibility of utilizing airborne laser techniques to measure sea state parameters and the velocity and direction of wind adjacent to an ocean surface. A summary of facts presently established is as follows: (a) The wind parameters adjacent to a water surface can be inferred remotely through the use of laser electro-optical instrumentation. (b) Wave height can be measured utilizing an AM/cw laser instrumentation concept and suitable data processing techniques. (c) The optimum laser transmission frequency based upon atmospheric transmission parameters as well as operational equipment considerations is 1.06 microns. (d) The SUEDE instrumentation can be constructed now utilizing available state-of-the-art technology and components. (e) Fine grain data on the reflective properties of ocean surfaces subjected to various wind fields is not available. The prototype SUEDE instrumentation would offer the fastest and most inexpensive means of obtaining this data. Accuracy evaluation of projected operational equipment requires this data. (f) Density variations beneath the ocean surface will not produce reflective returns that would modify expected system performance. (Author)
AD-646 828 HC$3.00 MF$0.65

8D. GEOCHEMISTRY

COMPILATION OF REPRINTS.
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 8A.
AD-646 466 Not available from CFSTI.

8E. GEODESY

AN APPLICATION OF METHODS OF FUNCTION MINIMISATION TO A PROBLEM OF NON-LINEAR CURVE FITTING ARISING IN THE ESTIMATION OF GEOPHYSICAL CONSTANTS FROM SATELLITE OBSERVATIONS.
Technical rept.,
Royal Aircraft Establishment, Farnborough (England).
B. A. M. Piggott. Aug 66, 22p TR-66260

Descriptors: (*Geophysics, *Synchronous satellites), (*Least squares method, Geophysics), Communication satellites (Active), Gravity, Curve fitting, Mathematical programming, Great Britain.
Identifiers: Syncom.

Observations of the mean longitude of two nearly synchronous satellites, Syncom 2 and Syncom 3, have been used to estimate the parameters associated with the most important longitude-dependent terms in the expansion of the Earth's gravitational field. This has been done by solving a non-linear least squares curve fitting problem using function minimisation techniques and the opportunity has been taken of comparing the efficiencies of a number of these techniques. Estimates of the accuracy of the parameter values obtained have been found from a linearised model. (Author)
AD-646 640 HC$3.00 MF$0.65

A DESCRIPTION OF THE NAVAL WEAPONS LABORATORY SATELLITE GEODESY SYSTEMS.
Naval Weapons Lab., Dahlgren, Va.
For primary bibliographic entry see Field 22B.
AD-646 731 HC$3.00 MF$0.65

EXPOSURE PREDICTIONS FOR GEODETIC SATELLITE PHOTOGRAPHY BY STELLAR PHOTOMETRY.
EG and G, Inc., Bedford, Mass.
For primary bibliographic entry see Field 22D.
AD-646 878 HC$3.00 MF$0.65

GEOPHYSICAL INVESTIGATIONS, COLLECTION I.
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
A. I. Zaborovskii. 1964, 59p ACIC-TC-1147 TT-67-60995
Trans. of Geofizicheskie Issledovaniya (USSR) n1 p130-61 1964.

Descriptors: (*Geodesics, *Gravity), Geophysics, Terrain, Corrections, Correlation techniques, Anomalies, Structural geology, Density, USSR.

Contents: On the question of compiling charts of local terrain corrections during a gravimetric survey; Interpretational possibilities of the method of statistical correlation of gravimetric and seismic data; On the nature of local gravity anomalies in the northwest Cis-Caucasus; Some questions of the deep structure of the earth's crust in the Cis-Caucasus; Methods and results of studying the earth-crust density cross section in the southern Verkhoyansk-Chukot folded region. (Author)
AD-646 881 HC$3.00 MF$0.65

U. S. NAVY DOPPLER TRACKING SYSTEM TRANET.
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
For primary bibliographic entry see Field 22D.
AD-646 904 HC$3.00 MF$0.65

8F. GEOGRAPHY

SOUTH AMERICAN SAVANNAS COMPARATIVE STUDIES LIANOS AND GUYANA.
Technical rept. of Savanna Research Project.
McGill Univ., Montreal (Quebec). Dept. of Geography.
Dec 66, 54p TR-5, Savanna Research Series-5
Contract Nonr-3855 (00)
See also AD-638 118.

Descriptors: (*Ecology, South America), (*Geography, South America), Terrain, Plants (Botany), Grasses, Trees, Hydrology, Soils, Climatology.

This is the first in a series of comparative studies of savannas of South America. The major objective is to provide basic quantitative information on the composition and structure of the vegatation of the savanna ecosystem. This dats is presented in a preliminary form as there is considerable demand for such data by botanists, ecologists, palynologists and geographers currently active in the field.
AD-646 514 HC$3.00 MF$0.65

THE GEOGRAPHIC DISTRIBUTION OF INFECTIOUS DISEASES.
Universities Associated for Research and Education in Pathology, Inc., Bethesda, Md.
For primary bibliographic entry see Field 6E.
AD-646 666 HC$3.00 MF$0.65

HANDBOOK OF SELECTED PACIFIC ISLANDS.
Miscellaneous pub.,
Pacific Missile Range, Point Mugu, Calif.
Edwin Doran, Jr. 20 Dec 59, 209p PMR-MP-59-30

Descriptors: (*Pacific Ocean Islands, Handbooks), Canton Island, Galapagos Islands, Johnston Island, New Guinea, Marshall Islands, Midway, Polynesia, Australia, Borneo, Terrain, Climatology, Ecology, Population, Harbors, Roads, Buildings, Government (Foreign), Maps.

Available physical and economic geographical information concerning the following atolls, islands, and specific areas of certain islands is summarized: Abemama; Aitutaki; Baker; Barking Sands (Kauai); Biak; Bikini; Bora-Bora; Canton; Christmas; Clarion; Clipperton; Darwin (Australia); Ducie; Eniwetok; Fiji; Galapagos; Guadalcanal; Guadalupe; Henderson; Howland; Jarvis; Johnston; Kalae (Hawaii); Kaneohe Bay (Oahu); Kapingamarangi; Kuching (Borneo); Kure; Kusaie; Kwajalein; Laysan; Lisianski; Majuro; Manus; Midway; Mussau; Nauru; Northwest Cape (Australia); Ocean; Oeno; Palmyra; Pitcairn; Ponape; Rarotonga; Tahiti; Tarawa; Tongareva; Tongatapu; Truk; Wake; Woomera (Australia).
AD-646 916 HC$3.00 MF$0.65

8G. GEOLOGY AND MINERALOGY

THE 'CAVE OF NESTOR', NEAR PILOS, GREECE.
Technical rept.,
California Univ., Davis. Dept. of Geology.
C. G. Higgins. 1965, 14p TR-4
Contract Nonr-2211 (02)
Availability: Published in Compte Rendu du IV. Colloque International de Speleologie p83-93 1965.

Descriptors: (*Marine geology, Greece), (*Sandstone, Structural geology), Geologic age determination, Stratigraphy, Soils, Limestone, Sedimentary rock, Silt, Archaeology.
Identifiers: Caves.

The so-called Cave of Nestor was first formed sometime after early Tertiary time, and was dissolved chiefly in a cataclastic breccia zone trending N. 20 degrees E. in a dense limestone of Eocene age. Subsequently, during Astian Pliocene time, at least the outer room of the cavern was flooded by the sea and marine sandstone was deposited there. After this marine intrusion, during a Pleistocene glacial stage, most of the Pliocene fill was removed and the cavern was partially filled with red soil. Later, possibly during the most recent glacial stage, the cavern was re-excavated and possibly enlarged. Subsequent human use has filled it with soil and debris to present floor level. Grottoes on Sfakteria Island, to the south, have similar histories. None of these caves shows any features attributable to solution in the phreatic zone.
AD-646 404 Not available from CFSTI.

SPREADING OF THE OCEAN FLOOR: NEW EVIDENCE,
Princeton Univ., N. J. Dept. of Geology.
F. J. Vine. 1966, 13p
Contract Nonr-1858 (10)
Availability: Published in Science v154 n3755 p1405-15 Dec 1966.

Descriptors: (*Marine geology, Ocean bottom), (*Ocean bottom topography, Marine geology), Ocean models, Drift, Faults (Geology), Magnetic anomaly detection, Earth (Planet), Magnetic fields, Geologic age determination, Igneous rock, Structural geology.

It is suggested that the entire history of the ocean basins, in terms of oceanfloor spreading, is contained frozen in the oceanic crust. Variations in the intensity and polarity of Earth's magnetic field are considered to be recorded in the remanent magnetism of the igneous rocks as they solidified and cooled through the Curie temperature at the crest of an oceanic ridge, and subsequently spread away from it at a steady rate. The hypothesis is supported by the extreme linearity and continuity of oceanic magnetic anomalies and their symmetry about the axes of ridges.
AD-646 522 Not available from CFSTI.

VESIAC MONTHLY BULLETIN OF VELA UNIFORM RESEARCH PUBLICATIONS.
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
For primary bibliographic entry see Field 8K.
AD-646 573 HC$3.00 MF$0.65

ENGINEERING CLASSIFICATION AND INDEX PROPERTIES FOR INTACT ROCK.
Rept. for 1 Feb 64-1 Apr 66,
Illinois Univ., Urban. Dept. of Civil Engineering.
D. U. Deere, and R. P. Miller. Dec 66, 318p
AFWL-TR-65-116
Contract AF 29 (601)-6319

Descriptors: (*Petrography, Experimental data), (*Engineering geology, *Rock (Geology)), Physical properties, Elasticity, Hardness, Mechanical properties, Statistical analysis, Engineering.

Physical and elastic properties of NX-size rock core from 27 localities were investigated in order to develop an engineering classification system for intact rock, and also to develop index properties related to important physical and engineering characteristics. Thirteen rock types are represented. Laboratory tests were conducted on these rocks as follows: unit weight, Shore scleroscope hardness, Schmidt hammer hardness, abrasion hardness, absorption, sonic-velocity stress-strain under cyclic loading to 5,000 psi, uniaxial stress-strain to failure, and point-load tensile strength. A total of 257 specimens with L/D ratios of 2:1 were tested. Statistical studies were conducted with the IBM 7094 computer to determine correlation and regression relationships for selected pairs of variables. A system of engineering classification is proposed in which rocks are classified on the basis of their strength and modulus properties either obtained directly from laboratory tests, or approximately from index properties recommended herein. Application of the proposed engineering classification system to data obtained by others is shown by individual charts for each of several different rock types. Five charts are presented for estimating the strength or modulus properties for intact rock from the numerical indices obtained by either the Schmidt hammer, the Shore scleroscope, or the sonic pulse velocity, all used in conjunction with the unit weight of the rock. (Author)
AD-646 610 HC$3.00 MF$0.65

THE USE OF STATISTICAL COMMUNICATION THEORY FOR CHARACTERIZATION OF POROUS MEDIA.
Kansas Univ., Lawrence. Dept. of Chemical and Petroleum Engineering.
For primary bibliographic entry see Field 12B.
AD-646 695 Not available from CFSTI.

PACIFIC PLEISTOCENE CORES: FAUNAL ANALYSES AND GEOCHRONOLOGY,
Scripps Institution of Oceanography, La Jolla, Calif.
Abner Blackman, and B. L. K. Somayajulu. 1 Aug 66, 4p
Contracts Nonr-2216 (23), AT (11-1)-34
Research supported in part by NSF.
Availability: Published in Science v154 n3751 p886-9 Nov 18 1966.

Descriptors: (*Geologic age determination, Plankton), Pacific Ocean, Sedimentation, Oceanology.

Two cores from the eastern Pacific were analyzed faunally and dated by the ionium-thorium method. Comparison of the results of these and of similar studies of Atlantic cores indicate that faunal changes, representing changes between the glacial and interglacial stages of the Pleistocene, occurred in both oceans simultaneously. (Author)
AD-646 703 Not available from CFSTI.

GEOSCIENCES AND TECHNOLOGY BULLETIN, VOL. 1, NO. 3, 1966.
Library of Congress, Washington, D. C. Aerospace Technology Div.
For primary bibliographic entry see Field 17J.
AD-646 738 HC$3.00 MF$0.65

GEOSCIENCES AND TECHNOLOGY BULLETIN, VOL. 1, NO. 2, 1966.
Library of Congress, Washington, D. C. Aerospace Technology Div.
For primary bibliographic entry see Field 17J.
AD-646 746 HC$3.00 MF$0.65

MEASUREMENT OF P AND S SOUND VELOCITIES UNDER PRESSURE ON LABORATORY MODELS OF THE EARTH'S MANTLE.
Annual summary rept., 15 Dec 65-14 Dec 66,
Lamont Geological Observatory, Palisades, N. Y.
Edward Schreiber. 14 Dec 66, 42p
Contract AF 49 (638)-1355, ARPA Order-292-66

Descriptors: (*Minerals, Sound transmission), Velocity, Measurement, Earth models, High-pressure research, Spinels, Obsidian, Silicates, Elasticity, Ultrasonic radiation.

The results of velocity measurements performed on specimens of polycrystalline forsterite with 6% porosity, a single crystal spinel, and on obsidian are reported. The velocities of compressional and shear waves were determined at both ambient (25C and 1 bar) conditions and as a function of pressure on all three specimens. Velocity as a function of temperature was measured to 150C at 1 atm on the obsidian specimen.
AD-646 782 HC$3.00 MF$0.65

GEOCHRONOLOGY OF THE MIDCONTINENT REGION, UNITED STATES. PART 1. SCOPE, METHODS, AND PRINCIPLES; PART 2. NORTHERN AREA; PART 3. SOUTHERN AREA; PART 4. EASTERN AREA,
Texas Univ., Austin.
Samuel S. Goldrich, William R. Muehlberger, Edward G. Lidian, Carl E. Hedge, and Manuel N. Bass. 15 Feb 66, 66p
AFOSR-67-0314
Contract AF 49 (638)-1115
Rept. on Proj. Vela Uniform. Prepared in cooperation with Geological Survey, Washington, D. C. and Geological Survey, Denver, Colo.
Availability: Published in Journal of Geophysical Research v71 n22 p5375-438 Nov 15 1966.

Descriptors: (*Geologic age determination, United States), Radioactive isotopes, Rubidium, Potassium, Strontium, Argon, Half life, Rock (Geology), Stratigraphy, Orogeny, Structural geology, Geological survey, Minerals.

More than 200 new isotopic ages using Rb-Sr and K-Ar methods and their analytical data are presented. These ages were determined on cuttings and cores from basement tests within the midcontinent of the United States. Outcrop samples were studied where necessary to fill in the regional pattern. The results of this study show that: the basement rocks appear to be younger from north to south; deeper erosional levels into the crust form the present upper surface of the basement in the northern midcontinent; Precambrian supracrustal volcanic and sedimentary rocks are abundantly preserved in the southern midcontinent; crustal reworking by younger orogenic belts is a common phenomenon and that lateral continental accretion should be accorded a minor role in the changes observed in the shape of the North American continent. (Author)
AD-646 796 Not available from CFSTI.

SHEAR PHENOMENA IN NATURAL GRANULAR MATERIALS.
Engineering Research Series,
Princeton Univ., N. J. Dept. of Civil and Geological Engineering.
Jean C. Dutertre, and Hans F. Winterkorn. 30 Oct 66, 120p Scientific-1, Princeton Soil ERS-6
AFCRL-66-771
Contract AF 19 (628)-5805

Descriptors: (*Minerals, Mechanical properties), (*Sand, *Soil mechanics), Particles, Shear stresses, Geometric forms, Density, Analysis.

An experimental and theoretical study of the shear behavior of noncohesive macroparticle systems. It deals particularly with the effect of shape and, to a certain extent, mineral composition of the particles on the parameters of the macromeritic shear equation. Of the different available methods for expressing particle shapes those were found most practical that are based on the maximum and minimum densities obtained with simple standardized packing methods. The minimum densities thus obtained corresponded closely with the critical void ratios derived from shear tests. The problem of the previously reported negative values for minimum void ratios, computed from experimental data with the macromeritic shear equation, was solved, and the theoretical validity of this practically proven equation was demonstrated. (Author)
AD-646 865 HC$3.00 MF$0.65

GEOPHYSICAL INVESTIGATIONS, COLLECTION I,
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
For primary bibliographic entry see Field 8E.
AD-646 881 HC$3.00 MF$0.65

ORLANDO AREA (ARMS-II),
Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 04.
CEX-63.6.1 HC$3.00 MF$0.65

X-RAY DETECTION OF DISORDERED ORTHOPYROXENES IN METEORITES SEMIANNUAL REPORT, JUN. 1 - NOV. 30, 1966.
Mellon Inst., Pittsburgh, Pa.
S. S. Pollack. 1966, 29p NASA-CR-81376
Contract NGR-39-008-013

Descriptors: *Meteoritic composition, *Pyroxene, *X-ray, Chondrite, Composition, Crystal, Debye-scherer ring, Detection, Diffraction, Disorder, Powder, Single.

For abstract, see STAR 05 06.
N67-16700 HC$3.00 MF$0.65

A COMPARATIVE STUDY OF GLAUCONITE AND THE ASSOCIATED CLAY FRACTION IN MODERN MARINE SEDIMENTS.
Florida State Univ., Tallahassee. Sedimentological Research Lab.
For primary bibliographic entry see Field 8J.
PB-174 002 HC$3.00 MF$0.65

A METHOD FOR DETERMINING THE TRAVEL TIME OF ELASTIC WAVES IN THE EARTH,
California Univ., Berkeley. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 8K.
PB-174 077 HC$3.00 MF$0.65

SHOCK COMPRESSION OF POROUS MAGNETITE,
Sandia Corp., Albuquerque, N. Mex.
Robert C. Bass. Oct 66, 10p
Contract AT (29-1)-789
Rock forming minerals.

Descriptors: (*Magnetite, Porosity), (*Shock waves, Geology).

SC-RR-66-547 HC$3.00 MF$0.65

8H. HYDROLOGY AND LIMNOLOGY

COMPILATION OF REPRINTS.
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 8A.
AD-646 466 Not available from CFSTI.

MODIFICATION OF NEARSHORE CURRENTS BY COASTAL STRUCTURES.
Miscellaneous paper,
United States Lake Survey, Detroit, Mich.
James H. Saylor. Jun 66, 17p MP-66-1

Descriptors: (*Water waves, Harbors), (*Harbors, Great Lakes), Structures, Water, Fluid flow, Motion, Wind, Velocity, Lake waves, Instrumentation, Breakwaters, Lakes, Hydrology.

This paper describes and presents the results of water current studies conducted along the shores of Lakes Superior, Michigan, and Erie. The studies have been made at various harbor locations with the purpose of establishing current magnitudes and patterns within the harbors and in the adjacent coastal areas, and relating the measured currents with the causative forces.
AD-646 820 HC$3.00 MF$0.65

8I. MINING ENGINEERING

A MATHEMATICAL PROGRAMMING MODEL FOR OPTIMUM DESIGN OF OPEN PIT ORE MINES.
Research rept.,
Carnegie Inst. of Tech., Pittsburgh, Pa. Management Sciences Research Group.
Manfred Meyer. Dec 66, 33p RR-92
Contract Nonr-760 (24)
Prepared in cooperation with Technische Hochschule Clausthal-Zellerfeld (Germany).

Descriptors: (*Mining engineering, *Mathematical programming), West Germany, Mathematical models, Economics, Design, Ores (Metal sources), Ores (Nonmetallic), Optimization.

It is shown that there exists a nonlinear function linking the direct operating profits (= proceeds from the sale of ore minus direct operating cost of extraction, transportation, and upgrading) to the shape and depth of an open pit ore mine. This gives rise to the question of how to find the overall maximum of the function. In this paper it is described how the maximum can be determined by a mathematical programming approach. A model is developed in which the hierarchical constraints as given by the petrophysical conditions concerning the wall slopes of the open pit mine and the application of separable programming in order to state the objective function play important roles. (Author)
AD-646 724 HC$3.00 MF$0.65

8J. PHYSICAL OCEANOGRAPHY

SPREADING OF THE OCEAN FLOOR: NEW EVIDENCE,
Princeton Univ., N. J. Dept. of Geology.
For primary bibliographic entry see Field 8G.
AD-646 522 Not available from CFSTI.

TRACK CHARTS, BATHYMETRY, AND LOCATION OF OBSERVATIONS, ATLANTIS II, CRUISE NO. 14, NORTH ATLANTIC OCEAN AND CARIBBEAN SEA, OCTOBER 20, 1064-DECEMBER 20, 1964,
Woods Hole Oceanographic Institution, Mass.
Frank Allstrom. 20 Dec 64, 32p WHOI-Ref-65-8
Contracts Nonr-2196 (00), AT (30-1)-1918
Not reproducible per CFSTI standards.

Descriptors: (*Oceanographic data, Atlantic Ocean), (*Caribbean Sea, Oceanographic data), Bathythermographs, Oceanographic vessels, Marine biology, Ocean bottom, Oceanographic equipment, Navigational aids, Loran, Hydrographic surveying.
Identifiers: Atlantis II.

This report contains charts of Cruise 14 of R/V ATLANTIS II in the North Atlantic Ocean northwest of the Amazon River Delta and in the Eastern Caribbean including the Carioca Trench. There are 22 charts plotted on a Mercator Projection (Longitude scale at the Equator 1:1, 045, 288; Latitude scale 1:1, 095, 679) showing the track of the cruise from the first to the final Hydrographic Station (ATLANTIS II stations 431 through 513). Inclusive in the plotted track is 36 hours dead steaming prior to the first station; exclusive of the plotted track is the run from the Pilot Station to and from Belem, Brazil. The other ports-of-call were Bridgetown, Barbados (twice) and Charlotte Amalie, St. Thomas, V.I. A cruise summary is presented in Chart 1.
AD-646 907 Not available from CFSTI.

TRACK CHARTS BATHYMETRY, AND LOCATION OF OBSERVATIONS, ATLANTIS II CRUISE NO. 22, NORTH ATLANTIC OCEAN, JUNE 10, 1966-AUGUST 3, 1966.
Technical rept.,
Woods Hole Oceanographic Institution, Mass.
William F. Kean, Jr., and Thomas E. Pease. Oct 66, 56p WHOI-Ref-66-54
Contracts Nonr-4029 (00), Nonr-2866 (00)

Descriptors: (*Underwater tracking, Atlantic Ocean), (*Bathythermograph data, Atlantic Ocean), Underwater sound, Maps, Symbols.

The report contains charts of Cruise 22 of Atlantis II in the North Atlantic Ocean. There are 46 charts plotted on a Mercator Projection (scale 1 degree longitude equals 4 inches) showing the track of the entire cruise. All types of observations made during the cruise are noted by suitable symbols or legends and are shown on Index Charts I and II. Soundings are read at each break in slope and written along the ship's track as often as space permits. (Author)
AD-646 908 HC$3.00 MF$0.65

A COMPARATIVE STUDY OF GLAUCONITE AND THE ASSOCIATED CLAY FRACTION IN MODERN MARINE SEDIMENTS.
Master's thesis,
Florida State Univ., Tallahassee. Sedimentological Research Lab.
David L. Bell. Oct 66, 123p Contrb-16

Descriptors: (*Sedimentation, *Clay minerals), Sedimentary rock, X-ray diffraction analysis, Crystal structure, Correlation techniques.

The crystallinity and mineralogy of both the glauconite and the clay fraction of 65 samples from six contemporary marine environments were investigated by X-ray diffraction. In areas of authigenic glauconite, a correlation is demonstrated between both the mineralogy and the degree of crystallinity of the glauconite pellets and that of the clay fraction. Detrital and relic glauconites are observed to exhibit different mineralogies as compared to their associated clay fractions. No consistent relationship is observed between degree of crystallinity and color of the pellets, and only two of the four mineralogic classes proposed by Burst (1958b) were common. (Author)
PB-174 002 HC$3.00 MF$0.65

RECENT SEDIMENTS AND SEDIMENTARY HISTORY ACROSS THE PACIFIC-ANTARCTIC RIDGE.
Master's thesis,
Florida State Univ., Tallahassee. Sedimentological Research Lab.
Samuel Koster. Nov 66, 90p Contrib-17

Descriptors: (*Sedimentation, Pacific ocean), Radioactive series, Antarctic regions, Quartz, Radioactive isotopes, Foraminifera, Particle size, Silt, Clay, Collecting methods, Magnetometers.

Sediment characteristics of 23 piston cores from the South Pacific sector of the Southern Ocean have been studied. Coarsest material and highest percentages of Foraminifera generally are found near the crest of the Pacific-Antarctic Ridge. Silt and clay size particles dominate in both the Southwestern Pacific Basin and the Pacific-Antarctic Basin. Rates of sedimentation have been calculated from thorium isotope ratios and detrital remanent magnetism data. In general the sediments in the Southwestern Pacific Basin thicken toward the Pacific-Antarctic Ridge; in the Pacific-Antarctic Basin they thicken toward the Antarctic continent. Rates vary from 0.11 cm per 1000 years for part of core 17-9 to 5.26 cm per 1000 years for part of core 14-3. Ice-rafted quartz sand grains occur in sediments at least 3.35 million years old. (Author)
PB-174 003 HC$3.00 MF$0.65

THE DEEP-SEA SEDIMENTS OF THE DRAKE PASSAGE AND SCOTIA SEA.
Master's thesis,
Florida State Univ., Tallahassee. Sedimentological Research Lab.
Thomas T. Mather. Oct 66, 107p Contrib-15
Grant NSF-GA-40

Descriptors: (*Sedimentation, Antarctic regions), Collecting methods, Electron microscopy, Stratigraphy, Quartz, Clay minerals, Bathythermograph data, Glaciers, Ice islands, Carbonate minerals, Deep water.

A paleomagnetic stratigraphy is presented using sixteen cores from this region using the natural remanent magnetism to estimate the age of the sediments within a core. The Scotia Sea cores show no characteristic sediment trends with depth. Cores from the Drake Passage are more heterogeneous, although those from nearer the Antarctic

continent, both in the Passage and Scotia Sea, have higher amounts of terrigenous fragments. Features attributed to glacial action have been found on the surface of quartz sand grains as revealed by electron microscopy. Small quantities of volcanic ash are found in most of the core samples and palagonite is dominant in one. The textural, carbonate, organic, and clay mineral analyses suggest a continuity of glacial conditions and ice rafting of continental glacially derived detritus has been an important sediment transport mechanism over the probable 1.9 x 1,000,000 year time span represented by the cores. The polarity of the natural remanent magnetism in one core suggests that ice rafting may have occurred as early as 3.0 x 1,000,000 years ago. (Author)
PB-174 004 HC$3.00 MF$0.65

EIGHT CORES FROM THE CENTRAL NORTH PACIFIC.
Data rept.
Pacific Oceanographic Lab., Seattle, Wash.
Aug 66, 18p IERTM-POL-2

Descriptors: (*Ocean bottom sampling, Experimental data), (*Pacific Ocean, Ocean bottom sampling), Microstructure, Mechanical properties, Particle size, Analysis, Gravel, Sand, Silt, Clay.

Results of a macroscopic and microscopic log and mechanical particle size analyses of eight cores obtained in June 1965 on a line from Attu to Johnson Island are presented. Sub-samples are available to qualified investigators. (Author)
PB-174 083 HC$3.00 MF$0.65

AN OCEANOGRAPHIC SECTION OFF THE CALIFORNIA COAST FEBRUARY 1966.
Data rept.,
Pacific Oceanographic Lab., Seattle, Wash.
R. K. Reed, and N. P. Laird. Sep 66, 56p
IERTM-POL-3

Descriptors: (*Pacific Ocean, *Oceanographic data), (*Sea water, Pacific Ocean), Bathythermograph data, Gravity, Temperature, Salinity, Ocean currents, California.

Physical oceanographic data obtained during February 1966 at 11 sites along 39 degrees N from 135 degrees W.eastward to the 100-fathom curve off the California coast are presented. Variations in properties, geostrophic flow and volume transport from data obtained both from Nansen casts and from an in-situ electronic sensing device (STD) are discussed. (Author)
PB-174 087 HC$3.00 MF$0.65

8K. SEISMOLOGY

COMPILATION OF REPRINTS.
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 8A.
AD-646 466 Not available from CFSTI.

THE S WAVE PROJECT FOR FOCAL MECHANISM STUDIES.
Final rept., 1 Aug 62-31 Dec 65,
Saint Louis Univ., Mo. Dept. of Geophysics and Geophysical Engineering.
William Stauder. Mar 66, 35p
AFOSR-67-0301
Grant AF-AFOSR-62-458, ARPA Order-292-62
Report on project VELA-UNIFORM. See also AD-615 621.

Descriptors: (*Earthquakes, Alaska), (*Seismic waves, Propagation), Polarization, Seismology.
Identifiers: S-waves, Vela-Uniform.

The general purpose of the investigation was the routine investigation of the focal mechanism of the larger earthquakes of each year. The focal mechanism of thirty-six earthquakes of 1962, of thirty-five earthquakes of 1963, and to date of forty-five earthquakes of 1964, including twenty-four earthquakes of the Alaska earthquake sequence of that year, have been determined. The project is continuing, in order to complete all earthquakes of 1964, under other sponsorship. The Alaska earthquake sequence of 1964 is reported in some detail. The mechanisms were found to fall into two groups, one with epicenters in the Kodiak Island region, the other with epicenters in the Prince William Sound region. All have a single steeply dipping well-determined P nodal plane. Orientation of this plane follows, in general, the trend of the tectonic features as they curve from the Alaska panhandle around the Prince William Sound area to the Kenai peninsula. The second nodal plane, identified by S wave data, is near horizontal. The mechanism is open to interpretation either as a reverse fault or as an overthrust. Reasons of strike of the P nodal planes, the spatial distribution of the earthquake foci, and peculiarities in mechanism along the line of greatest flexure of the trend of the tectonic features favor the overthrust hypothesis. General conclusions of the Project are summarized. These include especially the establishment of S wave as an independent means of source mechanism investigation or as an adjunct to P wave first motion, resolution of ambiguity of P wave data in certain types of radiation patterns, and ability to exclude centers of compression in some cases as the source of seismic waves. (Author)
AD-646 516 HC$3.00 MF$0.65

VESIAC MONTHLY BULLETIN OF VELA UNIFORM RESEARCH PUBLICATIONS.
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
15 Dec 66, 19p VESIAC Bull-47
See also AD-644 213.

Descriptors: (*Seismology, Periodicals), Bibliographies, Abstracts, Seismic waves, Nuclear explosions, Earthquakes, Structural geology.
Identifiers: Vela Uniform, VESIAC.

The listing contains abstracts of semiannual, annual, and final reports; technical notes and journal articles resulting from VELA Uniform sponsored research.
AD-646 573 HC$3.00 MF$0.65

SEISMIC DISCRIMINATION.
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
For primary bibliographic entry see Field 17J.
AD-646 677 HC$3.00 MF$0.65

GEOSCIENCES AND TECHNOLOGY BULLETIN, VOL. 1, NO. 3, 1966.
Library of Congress, Washington, D. C. Aerospace Technology Div.
For primary bibliographic entry see Field 17J.
AD-646 738 HC$3.00 MF$0.65

GEOSCIENCES AND TECHNOLOGY BULLETIN, VOL. 1, NO. 2, 1966.
Library of Congress, Washington, D. C. Aerospace Technology Div.
For primary bibliographic entry see Field 17J.
AD-646 746 HC$3.00 MF$0.65

FIRST RESULTS OF SEISMOLOGICAL INVESTIGATION RELATED WITH THE IBERIAN PENINSULA REGION,
Instituto Geografico y Catastral, Madrid (Spain).
J. M. Munuera, J. Morencos, A. Lopez Arroyo, and G. Payo. May 65, 26p
AFOSR-67-0308
Contract AF 61 (052)-657

Descriptors: (*Seismology, Spain), Structural geology, Calibration.

During the years (1963-1964) the research group of the Spanish Seismological Survey (SSS), Instituto Geografico y Catastral, Madrid carried out several seismological studies on the area 10 deg W-5 deg E, 35 deg-44 deg N. These studies correspond to the first part of a plan in course which intends to achieve a better knowledge of the seismic and structural characteristics of the said area. The investigations developed include: (a) local recording conditions; (b) standardization of calibration procedures; (c) crustal structure and; (d) seismic activity. All these studies have been published in 12 papers which represent the first contribution to a general seismic study of this area. The present paper analyzes the main results searching possible interrelations and indicating some suggested problems of interest from our point of view. (Author)
AD-646 777 HC$3.00 MF$0.65

THE FOCAL MECHANISM OF THE ALASKA EARTHQUAKE OF MARCH 28, 1964, AND OF ITS AFTERSHOCK SEQUENCE.
Interim rept.,
Saint Louis Univ., Mo. Inst. of Tech.
William Stauder, and G. A. Bollinger. 7 Jul 66, 19p
Scientific-2
AFCRL-67-0023
Contract AF 19 (628)-5100, ARPA Order-292
See also AD-639 386.
Availability: Published in Journal of Geophysical Research v71 n22 p5283-96 Nov 15 1966.

Descriptors: (*Earthquakes, Alaska), Seismology, Faults (Geology), Seismic waves, Mechanics.

Focal mechanisms have been determined for one preshock, for the main shock, and for more than 25 aftershocks of the Alaska earthquake of March 28, 1964. For the main shock a single nodal plane with a strike azimuth of 66 degrees, dip 85 degrees southeast, is determinable from the polarity of the P wave. This plane may be taken either as a plane normal to the fault motion (thrust faulting) or as the fault plane (dip-slip motion on a near-vertical plane). A combination of P wave first motion and S wave polarization data make possible the determination of both nodal planes in each shock studied of the aftershock sequence. One of these planes is near vertical and closely resembles the nodal plane of the main shock; the other dips 5 degrees to 15 degrees to the northwest or north. From dislocation theory it is shown that differential slip and/or a dipping thrust plane explain satisfactorily the observed vertical displacements at the surface. (Author)
AD-646 790 Not available from CFSTI

RESEARCH ON THEORETICAL SEISMOLOGY FINAL REPORT, JUL. 1, 1956 - JUN. 30, 1966.
Weizmann Inst. of Science, Rehovoth (Israel). American Committee.
C. L. Pekeris. 30 Aug 66, 27p AD-641201
Contract NONR-2189/00/

Descriptors: *Earthquake, *Nuclear explosion, *Seismology, *Wave propagation, Abstract, Approximation, Earth, Explosion, Flat, Layer, Liquid, Nuclear, Propagation, Solid, Sound, Sphere, Table, Theory, Travel, Wave.

For abstract, see STAR 05 06.
N67-15354 HC$3.00 MF$0.65

ACHIEVEMENTS OF SCIENCE - GEOPHYSICS, 1962.
Israel Program for Scientific Translations, Ltd. Jerusalem.
I. A. Khvostikov. 1966, 141p NASA-TT-F-383, TT-66-51020
Transl. Into English Of The Book "itogi Nauki

Geofizika" Moscow, Akad. Nauk Sssr, 1964 Published For Nasa And Nsf

Descriptors: *Climatology, *Meteorology, *Seismology, Atmosphere, Cloud, Crust, Earth, Forecasting, Geophysics, Heat transfer, Mantle, Mineral, Ozone, Physics, Precipitation, Structure, Turbulence, Weather, Wind.

For abstract, see STAR 05 06.
N67-15421 HC$3.00 MF$0.65

A PARAMETRIC SEISMOMETER,
California Univ., Berkeley. Seismographic Station.
Peter W. Rodgers. 28 May 65, 14p
Supported in part by NSF.

Descriptors: (*Seismographs, Design), Amplifiers, Electromagnetic pumps, Gain, Mechanical waves, Phase, Resonance, Frequency.

A parametric seismometer may be thought of as a mechanical amplifier which is forced to develop 'parametric gain' by the action of a 'pump'. The pump is simply an electromagnetic spring of time-variable stiffness whose purpose is to vary the restoring force on the mass of the seismometer in a certain periodic manner. The degenerate parametric seismometer consists of the pump, and the spring-mass system of a single conventional seismometer. If the pump is operated at twice the resonant frequency of the seismometer, the response to frame movements at the resonant frequency of the seismometer is greatly enhanced provided the phase with respect to the pump is correct. In the non-degenerate type of parametric seismometer, the dependence of the response on phase is relaxed by the introduction of another spring-mass system termed the idler seismometer.
PB-174 076 HC$3.00 MF$0.65

A METHOD FOR DETERMINING THE TRAVEL TIME OF ELASTIC WAVES IN THE EARTH,
California Univ., Berkeley. Dept. of Geology and Geophysics.
Peter W. Rodgers. 2 May 66, 17p
Grant NSF-GP-5547

Descriptors: (*Seismometers, Design), (*Geophysical prospecting, Instrumentation), Mechanical waves, Seismic waves, Detection, Phase modulation, Circuits.

A new method is described for determining the depth of or travel time reflecting layers or objects under the ground. The method uses as a source machine generated elastic waves. The method utilizes the unique properties of an elastic wave detector which is a degenerate parametric seismometer (see PB-174 076). The features which are novel about this method are as follows: (1) it is a steady state method which uses a phase comparison to measure the travel time of elastic waves; (2) it utilizes a type of detector not used before to observe elastic waves; (3) it couples together intimately two very sensitive methods for finding a periodic signal in noise, i.e. a degenerate parametric detector operated in conjunction with a correlation detector; (4) it uses a type of modulation (random phase) not used before with elastic waves.
PB-174 077 HC$3.00 MF$0.65

8M. SOIL MECHANICS

SHEAR PHENOMENA IN NATURAL GRANULAR MATERIALS.
Princeton Univ., N. J. Dept. of Civil and Geological Engineering.
For primary bibliographic entry see Field 8G.
AD-646 865 HC$3.00 MF$0.65

CBE FACTORS: MONTHLY SURVEY NO. 12.
Aerospace Technology Div., Library of Congress, Washington, D. C.
For primary bibliographic entry see Field 15B.
AD-646 899 HC$3.00 MF$0.65

ANALYSIS OF STRESS DISTRIBUTION BENEATH EMBANKMENTS.
Final research rept.,
Massachusetts Inst. of Tech., Cambridge. Soil Mechanics Div.
T. W. Lambe, R. C. Hirschfeld, and J. T. Christian. 1 Nov 66, 57p R66-53
Contract C-85-65
Northeast Corridor Transportation Project.

Descriptors: (*Soil mechanics, Stresses), Foundations (Structures), Distribution, Mathematical analysis, Transportation.

A mathematical analysis adapted to computer calculation is used to calculate stresses and displacements for complicated soil movements and for a large class of boundary conditions. Vertical stresses are found to be insensitive to variation in material properties and some boundary conditions, but marked changes in horizontal stresses suggest that elastic theory may be inaccurate. Additional work is suggested, to include further computer runs on a systematic basis, some improvements in the programs, and an extension of the work to study consolidation (the time-dependent dissipation of pore pressures), which is a major unsolved theoretical problem. (Author)
PB-173 637 HC$3.00 MF$0.65

EDDINGTON EXPERIMENTAL PROJECT, EDDINGTON, MAINE.
Final rept. (Technical paper),
Maine State Highway Commission. Soils Div.
James G. Ault. Dec 66, 160p TP-66-5, 0758
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. Rept. on Soil Mechanics Series.

Descriptors: (*Roads, Construction), (*Soil mechanics, Roads), Traffic, Engineering geology, Pavements, Climatology, Gravel, Sand, Silt, Asphalt, Bituminous coatings.

This report describes the performance on frost-susceptible soils in a secondary road of (1) bituminous-envelope base for 3 sections of flexible pavement and (2) 8 culverts with various conditions of backfilling and bedding. The experimental installations were constructed in 1949-50. The bituminous envelopes were composed of mixtures of RT-6 and crushed gravel-sand aggregate, with a designed thickness of 2 inches, and covered with a 2-in. bituminous-gravel surfacing. Each of the 3 sections was approximately 400 feet long, about one-half of the length of each section having the enveloped base 24 in. thick, while the remaining half was 18 in. thick, with bituminous envelope extending full width beneath the surfacing and tapering to closure in the shoulder. The enveloped soil ranged from silty sand to silty sandy gravel, and the subgrade soil ranged from sandy silt to silty gravel. The performance of the treated sections was compared to adjacent sections having gravel base course of 'conventional' design, but the report does not describe the design of these adjacent sections.
PB-174 018 HC$3.00 MF$0.65

8N. TERRESTRIAL MAGNETISM

THE BEHAVIOR OF PARTICLES OF RADIATION BELTS DURING MAGNETIC STORMS.
Volt Technical Corp., Washington, D. C.
For primary bibliographic entry see Field 4A.
For abstract, see STAR 05 06.
N67-16508 HC$3.00 MF$0.65

SOME GEOMAGNETIC AND IONOSPHERIC EFFECTS IN ANTARCTICA PRIOR TO STORM SUDDEN COMMENCEMENTS.
Avco Corp., Wilmington, Mass. Avco Space Systems Div.
For primary bibliographic entry see Field 4A.
PB-173 998 HC$3.00 MF$0.65

THE NATURE OF SPREAD-F IRREGULARITIES IN ANTARCTICA.
Avco Corp., Wilmington, Mass. Avco Space Systems Div.
For primary bibliographic entry see Field 4A.
PB-174 000 HC$3.00 MF$0.65

9. ELECTRONICS AND ELECTRICAL ENGINEERING

9A. COMPONENTS

A DISTORTION ANALYSIS OF THE MOS TRANSISTOR.
Interim rept.,
Illinois Univ., Urbana. Materials Research Lab.
Robert F. Pfeifer, and C. T. Sah. 1966, 8p
AFOSR-67-0107
Grant AF-AFOSR-714-67
Availability: Published in SCP and Solid State Technology p39-44 Nov 1966.

Descriptors: (*Transistors, Distortion), Signals, Performance (Engineering), Analog systems, Circuits, Analysis, Silicon, Oxides.
Identifiers: Metal oxide semiconductors.

Signal distortion arising from the non-linear (parabolic) transconductance voltage characteristics of the MOS transistor is determined experimentally by conventional distortion measurement techniques. It is shown that the experimental results yield good agreement with values predicted by existing theory for device operation in both the saturation and the non-saturation modes. Applicability of the MOS transistor for operation as an analog squaring device is suggested. (Author)
AD-646 411 Not available from CFSTI.

ANNUAL WIRE AND CABLE SYMPOSIUM (15th), 7, 8, AND 9 DECEMBER 1966, SHELBURNE HOTEL, ATLANTIC CITY, NEW JERSEY.
Army Electronics Command, Fort Monmouth, N. J. 1966, 12p

Descriptors: (*Electric wire, Symposia), (*Electric cables, Symposia), Performance (Engineering), Design, Processing, Manufacturing methods, Materials, Tests.

Session topics were: Cable performance; Cable design and applications; Process and manufacturing techniques; Special cables, Terminations and testing; Cable materials and process techniques.
AD-646 523 HC$3.00 MF$0.65

THE EFFECT OF POST GEOMETRY OF SOLDERLESS WRAPPED TERMINATION PERFORMANCE.
Engineering dept. rept.,
Burndy Corp., Norwalk, Conn.
Mark Auriana. 1966, 17p BEDR-7
Presented at the Annual Wire and Cable Symposium (15th), Atlantic City, N. J., 8 Dec 1966.

Descriptors: (*Electric terminals, Configuration), Performance (Engineering), Rectangular bodies, Circuit interconnections, Electric connectors, Winding.

Although there are other factors which will influence choice of wrapost geometry, such as contact spacing and wrapping tool accessibility, the ultimate criterion must be optimum performance. On this basis, there is strong evidence to indicate that, of the two most common configurations, .045 square and .031 x .062, rectangular posts are far superior for any application where mechanical distrubance of the wrapped termination is a realistic consideration. (Author)
AD-646 524 HC$3.00 MF$0.65

NEW DEVELOPMENTS IN CLAD METAL WIRE AND SHIELDING,
Texas Instruments, Inc., Attleboro, Mass. Materials Div.
John J. Ronan, and Harold H. Friedman. 1966, 9p

Descriptors: (*Electric cables, *Metal coatings), (*Cladding, Wire), Electric wire, Aluminum, Steel, Copper, Barrier coatings, Underground, Tapes.

The report presents the technical properties and characteristics of two of these new developments, namely, aluminum-steel-copper shielding tape for direct buried cable, and copper clad aluminum wire for communications and electrical applications.
AD-646 525 HC$3.00 MF$0.65

MEASURING PERFORMANCE OF AN EIGHT-INCH CABLE SHEATHING EXTRUDER,
Western Electric Co., Inc., Omaha, Neb.
For primary bibliographic entry see Field 13I.
AD-646 526 HC$3.00 MF$0.65

EFFECT OF EXTRUDER TEMPERATURE PROFILES ON STRESS-CRACK RESISTANCE OF A POLYETHYLENE SHEATHING COMPOUND,
Bell Telephone Labs., Inc., Murray Hill, N. J.
For primary bibliographic entry see Field 11I.
AD-646 527 HC$3.00 MF$0.65

MOISTURE PERMEATION AND ITS EFFECT ON COMMUNICATION CABLE,
Bell Telephone Labs., Murray Hill, N. J.
For primary bibliographic entry see Field 17B.
AD-646 528 HC$3.00 MF$0.65

THE DESIGN OF PLATED COAXIAL CABLE,
United-Carr, Inc. Cambridge, Mass. Exploratory Development Lab.
W. R. J. Brown, and R. L. Komack. 1966, 23p
Prepared for presentation at the Annual Wire and Cable Symposium (15th), Atlantic City, N. J., 7-9 Dec 1966.

Descriptors: (*Coaxial cables, Design), Plating, Strain (Mechanics), Theory, Metal films, Computer programs, Electrical properties.

A theoretical model of the strain produced in a plated coaxial cable upon bending over a mandrel of given radius was developed. This theory was used to evaluate the importance of various parameters such as groove depth, groove pitch, and wall angle on the strain produced in the metal film. The groove depth was found to be of most importance. The remaining parameters can be chosen for manufacturing convenience. The electrical properties of the cable can be predicted by considering the cable as an eccentric coaxial transmission line and using the appropriate equations for characteristic impedance and attenuation. The fact that the eccentricity spirals about the center conductor seems to have no effect on the accuracy for frequencies up to 12 GHz. The validity of the theory was checked by flexing to destruction a number of cable samples with different groove depths. The data for all of these samples were found to plot on a single curve. This curve is used to compute the flex life of new cable designs. A computer program has been developed which includes all of these factors.
AD-646 529 HC$3.00 MF$0.65

LOW-MODULUS MATERIALS FOR COAXIAL CABLE,
Battelle Memorian Inst., Columbus, Ohio.
R. M. Kell, Bailey Bennett, and P. B. Stickney. 1966, 14p
Prepared for presentation at the Annual Wire and Cable Symposium (15th), Atlantic City, N. J., 7-9 Dec 1966.

Descriptors: (*Coaxial cables, Materials), Plastics, Elastomers, Mechanical properties, Vulcanization, Coatings, Electric insulation, Low-temperature research.

Research was conducted to evaluate and develop new materials for both insulation and jacketing. The objective was to improve low-temperature flexibility without sacrifice of the desirable electrical and physical properties of existing cable materials. The conclusions are: (1) There is no single polymer available having the flexibility, resistance to deformation at elevated temperature, and electrical characteristics desired for insulation in coaxial cable for arctic use. (2) The desired balance of properties can be achieved by blending selected resins and elastomers. (3) Vulcanization of the polymer blend improves the physical properties permitting, for example, greater flexibility at low temperature with less sacrifice in high-temperature performance. However, the dielectric properties are adversely affected. (4) Blends consisting of approximately equal parts of high-molecular-weight polyisobutylene with a high-density ethylene copolymer have a good balance of physical properties and are extrudable. These blends appear promising for use as cable insulation and offer an improvement over existing materials. (5) Several new polymers in the polyurethane and ethylene copolymer class have demonstrated acceptable performance as cable jacketing and are more flexible at arctic temperatures than the polyvinyl chloride compositions presently used. (6) The best combination of flexibility, abrasion resistance, tear strength, and resistance to elevated-temperature deformation was exhibited by a millable, thermoplastic polyether urethane elastomer.
AD-646 530 HC$3.00 MF$0.65

DEGREE AND RATE OF CROSSLINKING OF CROSS LINKED POLYETHYLENE,
Dainichi-Nippon Cables Ltd., Amagasaki (Japan).
For primary bibliographic entry see Field 11I.
AD-646 531 HC$3.00 MF$0.65

HIGH-VOLTAGE UNDERWATER CABLE FOR TORPEDO PROPULSION,
Naval Underwater Weapons Research and Engineering Station, Newport, R. I.
W. R. Cox, and J. W. Blythe. 1966, 32p
Presented at the Annual Wire and Cable Symposium (15th), Atlantic City, N. J., 7-9 Dec 1966. Prepared in cooperation with General Electric Co., Lowell, Mass., Wire and Cable Dept.

Descriptors: (*Electric wire, Underwater), (*Torpedoes, Electric wire), Propulsion, Electric insulation, Performance (Engineering), Reliability.

The conclusions of the investigation are: (1) The dielectric, thermal and mechanical properties of the Kapton insulation are admirably suited to serve the unique needs of the short time duration underwater service. (2) The single-strand solid conductor provides considerably more favorable heat transfer through the insulation to the sea water than the equivalent cross section seven strand conductor. (3) A satisfactory solution to the dereeling problem requires innovations in the payout equipment and cannot be solved by conductor modifications alone. A tapered arbor held at the center of the coil has been very effective in eliminating kinking during the dereeling. (4) The reliability evaluation has given encouraging indices. More extensive and carefully designed tests are needed to establish a true criteria. (5) The polyimide, FEP Teflon sealed tape insulation system, is the best that has been tested and it promises to meet the present requirements of the application. (Author)
AD-646 532 HC$3.00 MF$0.65

FLAT CONDUCTOR CABLE MANUFACTURE AND INSTALLATION TECHNIQUES,
National Aeronautics and Space Administration, Huntsville, Ala. George C. Marshall Space Flight Center.
Wilhelm Angele. 1966, 45p
Prepared for presentation to the Annual Wire and Cable Symposium (15th), Atlantic City, N. J., 7-9 Dec 66.

Descriptors: (*Electric cables, Manufacturing methods), Installation, Design, Electric connectors, Electric terminals, Launch vehicles (Aerospace).

The various types of flat conductor cables and their design and manufacture are discussed. Cable termination techniques, interconnection hardware, cable harness manufacture, and installation methods are described. The results of an extensive flat cable installation exercise in the Saturn S-IVB stage are presented. Present plans are for design studies on the Apollo application systems. Also, further cable and connector hardware is being developed for higher frequency, high power, and connector pin function change requirements. (Author)
AD-646 533 HC$3.00 MF$0.65

AN AUTOMATIC TESTING SYSTEM FOR TELEPHONE CABLES,
Finnish Cable Works Ltd., Helsinki. Technical Research Div.
For primary bibliographic entry see Field 17B.
AD-646 534 HC$3.00 MF$0.65

PROTECTION OF GEOPHYSICAL, COMMUNICATION AND POWER TRANSMISSION CABLE AGAINST RODENT SPECIES ATTACK BY R-55 RODENT REPELLENT TREATMENT,
Phillips Petroleum Co., Bartlesville, Okla. Commercial Development Div.
T. H. Mailen, and R. E. Stansbury. 1966, 6p
Prepared for presentation at the Annual Wire and Cable Symposium (15th), Atlantic City, N. J., Dec 7-9, 1966.

Descriptors: (*Electric cables, Protective treatments), (*Protective treatments, Rodenticides), Polyethylene plastics, Barrier coatings, Symposia.

The chemical, tert butylsulfenyl dimethyldithiocarbamate (designated R-55 Rodent Repellent), which has a high degree of repellency to a number of animal and insect species was approved for the protective treatment of geophysical cables against specific rodent species attack. Rubber and polyurethane jacketed seismic cables treated with R-55 according to the established solvent technique have been in field use for several years. Treatments with R-55 Rodent Repellent have resulted in longer cable life, reduced cost of repairs, more effective use of field crew time and improved data. Plastic extrusion techniques indicate that it is possible to incorporate R-55 Rodent Repellent in polyolefin sheet and fabricated items. Laboratory test results show that polyolefin containing R-55 Rodent Repellent is highly repellent to attack by specific rodent species. Field experience, however, indicates that a barrier is necessary for the protection of buried cables from damage caused by rodents, such as pocket gophers. This barrier can be formed by the treatment of earth with a chemical, such as R-55 Rodent Repellent, or by incorpo-

rating this chemical in sacrificial coatings applied to the cables. (Author)
AD-646 536 HC$3.00 MF$0.65

THE EVOLUTION OF SHEATH CONSTRUCTIONS FOR COMMUNICATIONS CABLES,
Dow Chemical Co., Midland, Mich. Plastics Dept.
R. C. Mildner, W. E. Ropp, and J. H. Snow. 1966, 19p
Presented at the Annual Wire and Cable Symposium (15th), Atlantic City, N. J., 7-9 Dec 1966.

Descriptors: (*Electric cables, *Coatings), Metal coatings, Tapes, Plastic coatings, Electric insulation, Paper, Polyethylene plastics, Laminates, Joining, Communication equipment, Bonding, Barrier coatings, Steel, Aluminum, Construction.

Sheath constructions for multi-pair line communications cable, as developed in England, Germany and in the United States, are reviewed. It is concluded from the service experience reported that 'bonded jackets,' in which a metal tape shield is bonded to a plastic jacket, are equally suitable for paper and plastic-insulated cables. A theory of permeation through 'bonded jackets' is developed and reasons for discrepancies between theory and practice are discussed. Various aspects of the manufacture and splicing of 'bonded jacket' cable are considered. Experience in the fabrication of plastic/metal laminates over the past three years is given. The future of 'bonded jacket' cables also is discussed. (Author)
AD-646 537 HC$3.00 MF$0.65

APPLICATION OF WELDED THIN METAL IN NEW COMMUNICATION CABLE DESIGNS,
Canada Wire and Cable Co. Ltd., Toronto (Ontario).
J. Derek, A. Busby, Gunther Lehnert, Louis E. Marrin, and J. Vincent McBride. 1966, 12p
Presented at Annual Wire and Cable Symposium (15th), Atlantic City, N. J., Dec 7-9, 1966.

Descriptors: (*Electric cables, *Metal coatings), (*Industrial equipment, Metal coatings), Welding, Communication equipment, Design, Welds, Machines.

The purpose of this paper describes new machinery designed for the application of welded thin-wall metallic cable coverings, reviews the characteristics of the welded structures and discusses several typical cable designs.
AD-646 538 HC$3.00 MF$0.65

WATER STABILITY OF FILLED ELASTOMERS,
Sumitomo Electric Industries, Ltd., Osaka (Japan).
For primary bibliographic entry see Field 11J.
AD-646 539 HC$3.00 MF$0.65

SILICONE RUBBER SUITABLE FOR COAXIAL CABLE,
Boston Insulated Wire and Cable Co., Mass.
Alfred Garshick. 1966, 16p
Presented at Wire and Cable Symposium (15th), Atlantic City, N. J., Dec 7-9, 1966.

Descriptors: (*Coaxial cables, Silicone plastics), Synthetic rubber, Electrical properties, Mechanical properties, Dielectric properties, Performance (Engineering).

Data and information are presented which demonstrate that coaxial cables can be made from silicone rubber and still have electrical performance comparable to that currently obtained from polyethylene and TFE fluorocarbon for a certain frequency range. Improvement in bending and installation of finished cables can be achieved since the inherent properties of the dielectric material become the cable properties. High temperature service, room temperature flexibility, excellent dielectric strength and low temperature flexibility are among the outstanding characteristics. It is also expected that high corona extinction voltages can be maintained under continued bending because of SRF's flexibility. (Author)
AD-646 540 HC$3.00 MF$0.65

DESIGN AND MANUFACTURE OF PLASTIC INSULATED ALUMINUM CONDUCTOR TELEPHONE CABLE,
Bell Telephone Labs., Baltimore, Md.
For primary bibliographic entry see Field 17B.
AD-646 541 HC$3.00 MF$0.65

NEW COATING PROCESS FOR FOAMED POLYETHYLENE INSULATED TELEPHONE CABLE,
Sumitomo Electric Industries Ltd., Yokohama (Japan).
For primary bibliographic entry see Field 17B.
AD-646 542 HC$3.00 MF$0.65

PROTECTION OF TELEPHONE CABLES FROM ATTACK BY INSECTS,
Postmaster-General's Dept., Melbourne (Australia). Physics and Polymer Group.
For primary bibliographic entry see Field 17B.
AD-646 543 HC$3.00 MF$0.65

THREE TYPES OF CABLE SHEATH PRODUCED BY HIGH FREQUENCY WELDING,
AMF Thermatool, Inc., New Rochelle, N. Y.
Wallace C. Rudd. 1966, 14p
Prepared for presentation at Annual Wire and Cable Symposium (15th), Atlantic City, N. J., Dec 7-9 1966.

Descriptors: (*Electric cables, Metal coatings), (*Metal coatings, *Resistance welding), Aluminum, Manufacturing methods.

With the THERMATOOL high frequency resistance welding technique, three basic types of cable sheath welds can be produced in a variety of metals. All of the welds are continuous and do not involve the addition of any metal. They are all produced at speeds from 60 to hundreds of feet per minute. The sheath produced can in most cases be corrugated, and long lengths can be made in a single continuous operation. (Author)
AD-646 544 HC$3.00 MF$0.65

UNDERWATER DEGRADATION OF POLYETHYLENE FOR WIRE INSULATION,
Furukawa Electric Co. Ltd., Yokohama (Japan). Material Lab.
For primary bibliographic entry see Field 11I.
AD-646 545 HC$3.00 MF$0.65

A TANDEM WIRE DRAWING AND INSULATING LINE,
Western Electric Co., Inc., Baltimore, Md.
C. R. Bauer, and B. Batenburg. 9 Dec 66, 6p
Prepared in cooperation with Eaton Yale and Towne, Inc., Kenosha, Wis., Dynamatic Div. Prepared for presentation at the Annual Wire and Cable Symposium (15th) at Atlantic City, N. J. December 7, 8 and 9 1966.

Descriptors: (*Electric wire, Industrial production), Drawing (Machine processing), Electric insulation, Plastic coatings, Industrial equipment, Telephone lines.

The payer describes the operation of the tandem wire drawing and insulating line, to the extent of what takes place between the supply reel of bare conductor and the high speed take-ups containing the finished product. This is only one of the major steps required in the manufacturing process of PIC cable. This step, along with the entire PIC manufacturing facilities, provides reliable PIC cable for use in communications.
AD-646 546 HC$3.00 MF$0.65

A REVIEW OF POLYOLEFIN TEST REQUIREMENTS IN WIRE AND CABLE SPECIFICATIONS,
Phillips Petroleum Co., Bartlesville, Okla. Plastics Services Div.
R. J. Martinovich, and C. F. Leslie. 1966, 25p
Prepared for presentation at the Annual Wire and Cable Symposium (15th), Atlantic City, N. J., Dec 7-9, 1966.

Descriptors: (*Polyethylene plastics, Tests), (*Electric wire, Specifications), (*Electric cables, Specifications), Electric insulation, Plastic coatings, Density, Mechanical properties, Performance (Engineering).

The primary purpose of the presentation is to review some of the test parameters currently being employed for polyolefin resins in the wire and cable industry and at the same time to emphasize the significance of each test in terms of the role it plays in the intended application. Although directed specifically toward the wire and cable industry, some of these comments would also be applicable for other specifications in unrelated areas. (Author)
AD-646 547 HC$3.00 MF$0.65

CABLE INSULATION THERMAL LIFE STUDIES,
Marine Engineering Lab., Annapolis, Md.
Ernest H. Halpern, and Howard S. Ortgies. 9 Dec 66, 20p
Prepared for presentation at the Annual Wire and Cable Symposium (15th), 7-9 Dec 1966 at the Shelburne Hotel, Atlantic City, N. J.

Descriptors: (*Electric insulation, Life expectancy), (*Electric cables, Electric insulation), (*Plastics, Thermal properties), Degradation, Halocarbon plastics, Polyamide plastics, Aging (Materials), Wire, Ethylenes, Propenes.

In the thermal rating of magnet wires, the rate concept is taken into consideration. The thermal rating is based upon a 20,000 hour extrapolated life for magnet wires. With such a thermal-life rating it is possible to explore mechanisms of degradation of polymer insulation and at the same time upgrade polymeric insulation materials in thermal-life rating. Using a similar system of thermal-life rating which is summarized in Table I and Figure 1, (Ref. 1 and 2), thermal-life ratings may be determined for cables and wire. In some cases a thermal life rating will not be obtained in an expected temperature range. This may be indicative of a material incompatability such as an adhesive failure in a tape system. Such modifications in cable construction as paper separators can lead to a reduction in thermal-life rating. Topics included are: The thermal rating of H-film; The thermal-life rating of teflon; The thermal-life rating of ethylene propylene wires; Cut through on H-film data.
AD-646 548 HC$3.00 MF$0.65

THERMAL STABILITY OF CROSS-LINKED POLYETHYLENE,
Cooke Color and Chemical Co., Hackettstown, N. J.
For primary bibliographic entry see Field 11I.
AD-646 549 HC$3.00 MF$0.65

FOREIGN SCIENCE BULLETIN VOL. 3, NO. 1, 1967.
Library of Congress, Washington, D. C. Aerospace Technology Div.
For primary bibliographic entry see Field 5A.
AD-646 634 HC$3.00 MF$0.65

DEVELOPMENT AND EXPERIMENTAL EVALUATION OF AN AUTOMATED MULTIMEDIA COURSE ON TRANSISTORS.
RCA Service Co., Camden, N. J.
For primary bibliographic entry see Field 5I.
AD-646 671 HC$3.00 MF$0.65

INTEGRATED LOGIC NETS.
RCA Labs., Princeton, N. J.
For primary bibliographic entry see Field 9E.
AD-646 726 HC$3.00 MF$0.65

QUARTZ CRYSTAL AGING EFFECTS.
Semi-annual rept. no. 3, 15 Feb-15 Aug 66,
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
R. B. Belser, and W. H. Hicklin. Nov 66, 124p
Rept. no. 11
ECOM-02251-3
Contract DA-36-039-AMC-02251 (E)
See also AD-633 724

Descriptors: (*Quartz resonators, *Aging (Materials)), Reliability (Electronics), Failure (Electronics), Low frequency, Medium frequency, High frequency, X-ray diffraction analysis.

An investigation was made to reduce the aging and increase the reliability of quartz resonators. Average aging rates of 81.9 to 500 kHz units at 85C ranged from 0.15 to 0.28 ppm/wk for a period of 4500 hours subsequent to an initial aging phase of > 60 days. Units having lolished edges performed less well than others having a state-of-the-art edge finish. The average aging of 123 3 MHz resonators at 85C was 1.7 pp10 to the 9th power/wk during 4500 hours. Aluminum plated units mounted in evacuated HC-27/U holders averaged 0.72 pp10 to the 9th power/wk versus 1.5 pp10 to the 9th power/wk for gold plated ones. The average Q values were 1.2 and 0.75 x 10 to the 6th power respectively. Annular-field excitation of plano-convex 5 MHz units reduced aging rates to 1/10 that of conventionally-plated control units and the Q was doubled. Frequency spectra suffered no degradation. X-ray topography indicated oscillation was confined to the central 3/16 in. diameter zone for plano-convex units but extended over the entire plane-parallel zone (0.340 in. diameter) of units with beveled edges. The annulus was external to the active zone in the case of the plano-convex units and their Q values were four times greater. Aging of 10 MHz resonators at 125C indicated container dependency; rates for units in T-5 1/2 holder were greater than for those in HC-27/U. Serious outgassing or higher initial pressures in the T-5 1/2 holder are indicated. (Author)
AD-646 737 HC$3.00 MF$0.65

DIRECT MEASUREMENT OF THE DEPLETION LAYER WIDTH VARIATION VS APPLIED BIAS FOR A P-N JUNCTION,
California Univ., Berkeley. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 20L.
AD-646 836 Not available from CFSTI.

THE NUMBER OF TERMS IN THE GENERAL GAIN FORMULAS FOR COATES AND MASON SIGNAL FLOW GRAPHS,
California Univ., Berkeley. Electronics Research Lab.
Jean Paul Jacob. 25 Mar 65, 6p
AFOSR-67-0346
Grant AF-AFOSR-139-64
Availability: Published in IEEE Transactions on Circuit Theory p601-4 Dec 1966.

Descriptors: (*Electrical networks, *Graphics), (*Matrix algebra, Electrical networks), Determinants, Signals, Circuits.
Identifiers: Signal flow graphs.

The paper answers the question: 'Given a Coates flow graph or a Mason signal flow graph, how many 'connection paths' or 'loop products' will one have to find in order to compute the numerator and denominator of their general gain formula.' The answer to this question is given with the help of the concept of the permanent of a matrix. (Author)
AD-646 838 Not available from CFSTI.

METAL-OXIDE-SEMICONDUCTOR FIELD-EFFECT TRANSISTORS IN DIGITAL CIRCUITS.
Technical memo.,
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
G. Donald Wagner. Dec 66, 112p TG-875
Contract NOw-62-0604

Descriptors: (*Transistors, Digital systems), Circuits, Semiconductors, Inverter circuits, Metals, Oxides.
Identifiers: Metal oxide semiconductors, Field-effect transistors.

The metal-oxide-semiconductor field-effect transistor (Mos Fet) is evaluated for use in digital circuitry. The basic building block, the digital inverter, is described and analyzed for four types of loading. The loads considered are: resistor load, enhancement mode MOS Fet load, depletion mode MOS Fet load, and complementary MOS Fet Load. Characteristics such as load line characteristics, power dissipation, transfer characteristics, and transient performance are discussed and compared. Equations describing the characteristics of each circuit have been derived and verified experimentally. The results clearly indicate the superior electrical characteristics of the complementary circuits. A typical complementary MOS Flip-Flop capable of one MHz operation is illustrated. (Author)
AD-646 914 HC$3.00 MF$0.65

FAILURE RATE COMPUTATIONS BASED ON MARINER MARS 1964 SPACECRAFT DATA.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
F. H. Wright. 15 Jan 67, 16p NASA-CR-81192, JPL-TR-32-1036
Contract NAS7-100

Descriptors: *Cost estimate, *Failure mode, *Mars spacecraft, *Spacecraft reliability, Analysis, Cost, Data, Estimate, Failure, Mariner c program, Mode, Part, Prediction, Rate, Reliability, System, Time.

For abstract, see STAR 05 06.
N67-15684 HC$3.00 MF$0.65

A 100 KILOGAUSS QUASI-CONTINUOUS CRYOGENIC SOLENOID, PART I.
Mcgill Univ., Montreal (Quebec). Eaton Electronics Research Lab.
L. Lontai, and P. Marston. 19 Oct 66, 13p TR-9, AD-641920
Contract NONR-3013/00/

Descriptors: *Cryogenic magnet, *Solenoid, *Stress analysis, Analysis, Continuous, Cryogenic, Field, Magnet, Magnetic, Stress, Winding.

For abstract, see STAR 05 06.
N67-16437 HC$3.00 MF$0.65

A FUNCTIONALLY-INTEGRATED CONTROLLER- COMMUTATOR FOR USE IN BRUSHLESS DIRECT-DRIVE SOLAR ARRAY REORIENTATION SYSTEMS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 10B.
For abstract, see STAR 05 06.
N67-16544 HC$3.00 MF$0.65

PHASE I REPORT ON DEVELOPMENT OF A LOW-NOISE 8 MM RECEIVER FRONT END.
Trg, Inc., Melville, N. Y.
Nov 66, 9p NASA-CR-81346, R-1523-1
Contract NAS7-100
Prepared For Jpl

Descriptors: *Amplifier design, *Radio receiver, *Wideband communication, Amplifier, Astronomy, Communication, Design, Diode, End, Front, Noise, Radio, Receiver, Wideband.

For abstract, see STAR 05 06.
N67-16635 HC$3.00 MF$0.65

PROJECT "DIODE RELIABILITY PREDICTION TECHNIQUE".
Hughes Aircraft Co., Culver City, Calif.
For primary bibliographic entry see Field 14D.
For abstract, see STAR 05 06.
N67-16670 HC$3.00 MF$0.65

MILLIMETER-WAVE GENERATION WITH ELECTRON-BEAM DEVICES. A CRITICAL SURVEY OF THE STATE OF THE ART.
National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
B. Kulke. Feb 67, 38p NASA-TN-D-3727
Contract 125-22-03-13-25

Descriptors: *Electron beam, *Millimeter wave, *Wave generation, Beam, Circuit, Coupler, Cyclotron, Device, Electron, Generation, Harmonic, Linear, Maser, Millimeter, Oscillator, Periodic, Transverse, Tube, Wave.

For abstract, see STAR 05 06.
N67-16685 HC$3.00 MF$0.65

WAVEGUIDE ATTENUATORS 2.60 TO 40.0 GHz 0 TO 50 DB.
Technical manual instrument calibration procedure, GA-04.
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
1 Dec 66, 137p
NAVAIR-17-20GA-04

Descriptors: (*Attenuators, Waveguides), (*Calibration, Attenuators), Instruction manuals, Microwave frequency, Test methods, Test equipment (Electronics).

The procedure describes the calibration of fixed or variable waveguide attenuators of values between 0 and 50 db in the frequency range of 2.60 to 40.0 GHz.
PB-174 086 HC$3.00 MF$0.65

9B. COMPUTERS

SMOOTH REGRESSION ANALYSIS,
Johns Hopkins Univ., Baltimore, Md.
For primary bibliographic entry see Field 12A.
AD-467 119 HC$3.00 MF$0.65

STUDY OF PIECE PART FAULT ISOLATION BY COMPUTER LOGIC.
Pennsylvania Univ., Philadelphia. Inst. for Cooperative Research.
For primary bibliographic entry see Field 16A.
AD-646 358 HC$3.00 MF$0.65

HARDWARE AIDS FOR AUTOMATA DESIGN,
RAND Corp., Santa Monica, Calif.
Norman B. Reilly. Dec 66, 36p RM-5153-ARPA
Contract SD-79, ARPA Order-189-1

Descriptors: (*Bionics, Nervous system), (*Nervous system, Models (Simulations)), Compute

logic, Circuits, Nerve cells, Computers, Control systems, Automata, Design.

A description is presented of the hybrid computing hardware of a system designed to provide basic building blocks from which large neural networks can be constructed. The relationship of these building blocks to automata theory is discussed, and their possible usefulness in the construction of neural nets is examined. A simple network, containing at least one representative of each of five basic types of circuits, is constructed and the logical properties of the building blocks are described. An appendix gives detailed descriptions of the required circuitry and control functions. (Author)
AD-646 393 HC$3.00 MF$0.65

JOSS: USER SCHEDULING AND RESOURCE ALLOCATION,
RAND Corp., Santa Monica, Calif.
G. E. Bryan. Jan 67, 94p RM-5216-PR
Contract F44620-67-C-0045

Descriptors: (*Computer programs, Scheduling), (*Scheduling, Programming (Computers)), Real time, Input-output devices, Man-machine systems, Computer storage devices, Synchronization (Electronics), Monitors, Queueing theory.
Identifiers: JOSS.

A detailed description of the monitor, the supervisory unit that exercises overall control of the JOSS system's operation. The monitor acts as a scheduling, resource-allocating, and synchronizing device, deciding priority and ensuring that all data and hardware necessary for a particular action are simultaneously available. This Memorandum covers the priority queue structure, the hardware components comprising the JOSS computer system and their function in the JOSS environment, and instructions for operations of the JOSS system.
AD-646 395 HC$3.00 MF$0.65

INFORMATION HANDLING PROPERTIES OF NEUROMIME NETS.
Final rept. 15 May 64-31 May 65,
Systems Research Labs., Inc., Dayton, Ohio.
Robert M. Colomb. Sep 66, 17p
AMRL-TR-66-128
Contract AF 33 (615)-1825

Descriptors: (*Data processing systems, *Bionics), (*Artificial intelligence, Pattern recognition), Mathematical models, Learning machines, Instruction manuals, Programming (Computers).
Identifiers: Neuromime networks.

The report is a study on some elementary information handling properties of neuromime nets, giving most emphasis to the functioning of a single neuromime component, and containing some discussion of the operation of simple nets. Single component computation is treated from the point of view of changes brought about in the internal structure by operations performed during data flow. A geometrical model is presented which illustrates the pattern measurement behavior of the component, and some of the simpler differential equations of adaptation are solved to provide some insight into the effect and interaction of the component control parameters. Simple net behavior is concerned mainly with feedback interaction among components, and gives some useful notation for describing net operation. (Author)
AD-646 441 HC$3.00 MF$0.65

A HIGH-SPEED SERIAL ADDER OF THE INTERMDIATE TYPE,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
M. G. Gogoberidze, and T. V. Dolidze. 5 Oct 66, 9p FTD-HT-66-403
TT-67-60796

Unedited rough draft trans. of mono. Elementy Kiberneticheskikh Sistem, Tiflis, 1964 p163-71.

Descriptors: (*Binary arithmetic, *Digital computers), Design, Operation, USSR.
Identifiers: Adders (Computers).

The article examines a high-speed binary serial adder of the intermediate type that is connected with a memory device of the parallel type. For the formation of a digital sum the adder forms the functions E (a, b), E' (a' b') and Q sub s (aE). The formation of the function Q sub s and the transfer for the next cycle occurs simultaneously. A special trigger of the digital sum preserves the digit of one sum until the Q sub s signal is received, after which its state is reversed and the digital sum S is fixed. It is proposed that the application of this device will remove the basic efficiencies of the existing devices of this type. (Author)
AD-646 506 HC$3.00 MF$0.65

LEAST SQUARES CURVE FITTING BY COMPUTER: A LEAST SQUARES ITERATIVE TECHNIQUE IS DEVELOPED TO SOLVE MULTIPLE LINEAR REGRESSION PROBLEMS FOR n-DIMENSIONAL CURVE FITTING BY USE OF FORTRAN IV SUBROUTINES.
Naval Missile Center, Point Mugu, Calif.
For primary bibliographic entry see Field 12A.
AD-646 511 HC$3.00 MF$0.65

CHITRAN - A 7030 (STRETCH COMPUTER PROGRAM FOR THE CHI-SQUARE TEST OF NORMALITY.
Naval Weapons Lab., Dahlgren, Va.
For primary bibliographic entry see Field 12A.
AD-646 577 HC$3.00 MF$0.65

ATMOSPHERIC DENSITY DETERMINATION FROM LOW HEIGHT SATELLITES.
International Business Machines Corp., Cambridge, Mass. Cambridge Advanced Space Systems Dept.
For primary bibliographic entry see Field 4A.
AD-646 584 HC$3.00 MF$0.65

ON SHIFT-REGISTER REALIZATIONS OF SEQUENTIAL MACHINES,
Northwestern Univ., Evanston, Ill. Information-Processing and Control Systems Lab.
Chau Chang Su. Jan 67, 61p TR-67-104
Contract N00014-66-C-0020-A03, Grant AF-AFOSR-98-65

Descriptors: (*Automata, *Shift registers), Algorithms, Synthesis, Graphics, Computer logic, Computer storage devices, Digital computers, Programming (Computers), Combinatorial analysis.
Identifiers: Sequential machines, State assignments.

The problem of determining secondary state assignments for sequential machines such that the binary memory elements are connected in the form of shift registers is studied. Algorithm for finding such state assignments is developed. One or more code words may be assigned to a state of the sequential machines. The only restriction is that the realizations be unitary. A single shift-register realization of a sequential machine is unitary if and if all code words assigned to a state have the same first digit. In a multiple shift-register realization of a sequential machine, corresponding to each shift register, there exists a set system on the state set of the sequential machine. A multiple shift-register realization is unitary if each of the set system is a partition and if all code words assigned to a block of the partitions have the same first digit. With our technique, the unitary realizations consisting of the least number of shift registers can be found for any finite, deterministic, synchronous and reduced (minimal-state) sequential machine, each of whose states has a non-empty predecessor set. The algorithm is suitable for programming on digital computers. (Author)
AD-646 593 HC$3.00 MF$0.65

RELIABLE COMPUTATION WITH UNRELIABLE ELEMENTS,
Imperial Coll. of Science and Technology, London (England). Dept. of Electrical Engineering.
Jack D. Cowan. Jul 66, 17p
Contract N62558-4256

Descriptors: (*Computers, Reliability), Malfunctions, Failure (Electronics), Redundant components, Errors, Corrections, Computer logic.

The paper discusses computer system designs for operation at any required level of reliability, given unreliable elements. Methods discussed are: control of stationary errors and fault-masking of transient errors.
AD-646 625 HC$3.00 MF$0.65

AN ALGOL CONVOLUTION PROCEDURE BASED ON THE FAST FOURIER TRANSFORM.
Stanford Research Inst., Menlo Park, Calif. Mathematical Sciences Dept.
For primary bibliographic entry see Field 12A.
AD-646 628 HC$3.00 MF$0.65

A METHOD FOR PREDICTING PERFORMANCE OF OPEN SEAT EGRESS SYSTEMS,
Naval Ordnance Test Ordnance Test Station, China Lake, Calif.
For primary bibliographic entry see Field 1C.
AD-646 650 HC$3.00 MF$0.65

THE GEOGRAPHIC DISTRIBUTION OF INFECTIOUS DISEASES.
Universities Associated for Research and Education in Pathology, Inc., Bethesda, Md.
For primary bibliographic entry see Field 6E.
AD-646 666 HC$3.00 MF$0.65

ALL UNION CONFERENCE-SEMINAR ON THE THEORY AND METHODS OF USING MATHEMATICAL MODELS. TRANSACTIONS.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
13 Jan 67, 509p FTD-MT-344
TT-67-60878
Edited machine trans. of Kombinirovannye Vychslitelnye Mashiny. Vsesoyuznyi Konferentsii-Seminar po Teorii i Metodam Matematicheskogo Modelirovaniya. Trudy (no. 2), Moscow, 1962 295p.

Descriptors: (*Mathematical models, *Symposia), (*Analog-digital computers, Theory), Simulation, Digital differential analyzers, Analog computers, Digital-to-analog converters, Analog-to-digital converters, Design, Operation, USSR.

The book is a collection of papers read at the Second All-Union Conference-Seminar on the Theory and Methods of Mathematical Simulation held at Moscow from 1st through 4th November 1961. The conference was devoted to hybrid analog-digital computers. In the papers there have been examined questions of theory of hybrid computers, the development of designs digital differential analyzers and their individual units, the theory and methods of designing analog-to-digital and digital-to-analog converters, the development of high-speed elements in analog computers and of different applications of hybrid computers. The book is of interest to specialists, operating in the field of creating of computer-technology facilities intended for the simulation and the analysis of automatic control systems, and also for specialists, working in fields employing computers. (Author)
AD-646 712 HC$3.00 MF$0.65

USERS' MANUAL FOR THE EDITOR,
Mitre Corp., Bedford, Mass.
Ben Isquith. Nov 66, 83p MTR-222
ESD-TR-66-309
Contract AF 19 (628)-5165

Descriptors: (*Computer programs, Instruction manuals), Programming languages, Syntax, Programming (Computers).
Identifiers: EDITOR I program, On-line systems.

EDITOR I is an on-line program within the initial PHOENIX computer software system which enables the system user to create, destroy, or modify his collection of symbolic data, organized as files. The actions of EDITOR I are user-controlled by means of a one-pass assembler. (Author)
AD-646 717 HC$3.00 MF$0.65

INTEGRATED LOGIC NETS.
RCA Labs., Princeton, N. J.
For primary bibliographic entry see Field 9E.
AD-646 726 HC$3.00 MF$0.65

HARDWARE DOCUMENTATION OF A 127 - BUTTON ACCESSORY KEYBOARD.
Technical rept.,
Columbia Univ., Dobbs Ferry, N. Y. Hudson Labs.
Charles Amann, and Melvin Klerer. Oct 66, 46p TR-126
Contract Nonr-266 (84)

Descriptors: (*Input-output devices, Design), Typewriters, Programming (Computers), Magnetic tape, Circuits.
Identifiers: Keyboards, Flexowriters.

The Accessory Keyboard is a general, low-speed, experimental unit for an automatic programming system. The system permits mathematical symbols and phrases to be automatically typed on a Flexowriter. It has 127 coded push-button inputs corresponding to 127 optional phrases, symbols, or programs. (Author)
AD-646 763 HC$3.00 MF$0.65

ANALYSIS AND SIMULATION OF WORD-SELECTION PROCEDURES IN ERROR-FREE COMMUNICATION SYSTEMS. PART I. COMPUTER PROGRAMS AND MATHEMATICAL THEORY.
New York Univ., N. Y. Lab. for Electroscience Research.
For primary bibliographic entry see Field 9D.
AD-646 780 HC$3.00 MF$0.65

COMPUTER TECHNOLOGY.
Rept. no. 8 on ATD work assignment no. 81,
Library of Congress, Washington, D. C. Aerospace Technology Div.
Boris Doncov. 30 Dec 66, 61p ATD-66-145
TT-67-60967
Compilation of abstracts based on Soviet open sources pub. 1965-66. Rept. on Surveys of Foreign Scientific and Technical Literature.

Descriptors: (*Computers, Bibliographies), Abstracts, Analog computers, Digital computers, Computer logic, Computer storage devices, Coding, USSR.

The 45 abstracts are arranged alphabetically by author within each of the following categories: components (4 entries); design (23 entries); applications (3 entries); and associated systems (15 entries). A bibliography is presented at the end of the report. Pertinent information included: a multichannel autocompensating multiplier/divider unit, analog-digital signal comparison circuit, use of digital logic elements in analog machines designed for solving boundary problems, EASP-S electronic random process analyzer, BESM-6 computer complex, memory units, long-time memory system, M-20 digital computer, system for information transfer between digital and analog computers, gathering primary video information with slow-scan TV facilities, single-channel digital optimizer, information referral center, code converters, relay-type contactless regulator. (Author)
AD-646 797 HC$3.00 MF$0.65

UPDATE: A UTILITY PROGRAM FOR THE AN/GYK-3 (V) MODULAR DATA PROCESSING SYSTEM.
Memorandum rept.,
Naval Research Lab., Washington, D. C.
Robert M. Cameron. 4 Jan 67, 17p NRL-MR-1738

Descriptors: (*Computer programs, *Data processing systems), Digital computers, Real time, Instruction manuals.
Identifiers: UPDATE program, AN/GYK-3 (V).

UPDATE was written as an interim solution to the basic problem all data processing systems face in a real time environment: total loss of all unprocessed data during error-induced diagnostic recovery modes. It provides the user with a means of periodically updating the permanent drum copy of any data object from its core image, thus allowing a return from diagnostics to an operational environment with a minimal loss of data. UPDATE is part of the Automatic Operating and Scheduling Programs' (AOSP) repertory of service and utility routines for the AN/GYK-3 (V) (Burroughs D-825) computer, and is available for use by all operational programs. The report includes operating instructions, a detailed description of the program, a Neliac source listing, an octal dump of the object tape, and a generalized flow chart indicating the sequence of events during the execution of the program. (Author)
AD-646 798 HC$3.00 MF$0.65

PERIPHERAL EQUIPMENT FOR A SMALL DIGITAL COMPUTER,
Saskatchewan Univ., Saskatoon.
A. D. Booth, and J. M. S. deVries. 1966, 9p
Grant DRB-9931-12
Prepared in cooperation with Northern Electric Research Labs., Saskatoon. Research supported in part by NRC.
Availability: Published in Electronic Engineering p155-63 Mar 1966.

Descriptors: (*Digital computers, Instrumentation), Reliability, Computer logic, Reading machines, Typewriters, Control systems, Canada.

The complete M.3 system is shown. The input-output console can be removed from the machine and can be replaced by an analogue-digital, digital-analogue convertor system when it is desired to use the machine in process control applications. The system has now been operating for nearly two years and seems to have a mean-free path between faults of over three months. Such reliability is surprising in a drum-type machine especially as the M.3 drum has been in operation, (partly on an earlier M.2 system) since 1956 and has never been serviced. It is proposed to replace this drum with a core store so constructed as to simulate the serial behaviour and digit rate of the drum but to eliminate the latency of the latter. (Author)
AD-646 823 Not available from CFSTI.

INCEPTION, DESIGN AND IMPLEMENTATION OF A MANAGEMENT INFORMATION SYSTEM.
American Univ., Washington, D. C.
For primary bibliographic entry see Field 5A.
AD-646 851 HC$3.00 MF$0.65

DIALOG: A CONVERSATIONAL PROGRAMMING SYSTEM WITH A GRAPHICAL ORIENTATION.
Technical note,
IIT Research Inst., Chicago, Ill. Computer Sciences Div.
Scott H. Cameron, Duncan Ewing, and Michael Liveright. Sep 66, 50p IITRI-TN-109
Contract Nonr-3392 (00)

Descriptors: (*Programming languages, *Graphics), (*Man-machine systems, Compilers), Operation, Algebra, Input-output devices, Programming (Computers).
Identifiers: DIALOG, On-line systems.

DIALOG is an algebraic language for on-line use with a graphical input-output console device. It is a computational aid for the casual user, which provides basic facilities for graphical and numeric input and display, on and off-line program preparation and storage, and hard copy presentation of results. Use of the system requires a minimum of experience or instruction, since the growth of an overlaying system control language has been prevented, and there are no processor-oriented statements, like variable type or dimension declarations. Moreover, in the on-line situation, the processor interacts with the graphical keyboard on a character by character basis so as to restrict the programmer's choice of input symbols to those which are syntactically correct. DIALOG has been in daily operation at the IIT Research Institute since February, 1966. (Author)
AD-646 857 HC$3.00 MF$0.65

EQUATIONS AND COMPUTER PROGRAM TO CALCULATE THE THERMAL HISTORY OF A DUAL-LAYERED PLATE SUBJECT TO THE THERMAL PULSE OF A NUCLEAR WEAPON.
Naval Applied Science Lab., Brooklyn, N. Y.
For primary bibliographic entry see Field 13J.
AD-646 858 Not available from CFSTI.

AIR FORCE ADP EXPERIENCE HANDBOOK (PILOT VERSION).
Final rept. 16 Feb-15 Dec 66.
Planning Research Corp., Los Angeles, Calif. Information Systems Div.
Dec 66, 208p PRC-R-930
ESD-TR-66-673
Contract AF 19 (628)-5988

Descriptors: (*Data processing systems, Handbooks), Information retrieval, Costs, Classification, Subject indexing, Data storage systems, Computers, Computer personnel, Computer programs, Graphics, Flow charting, Abstracts, Air Force, Management engineering.

The purpose of the pilot version is to acquaint Air Force personnel with the concept of using highly organized, summarized, and retrievable ADP experience in judging proposals for new automation. The pilot version of the handbook contains data collected after the fact from only 18 ADP systems, and hence the handbook has limited usefulness for actual evaluation of ADPS proposals. It does however, contain cost estimation equations and narrative experience that will be useful until the 200 system handbook can be produced. Experience relevant to a proposed ADPS is retrieved from the handbook via information extracted from the proposal. The extracted information consists of quantitative workload descriptors of the proposed ADPS (e.g., number of input data fields and number of output formats) and certain qualitative descriptors (e.g. centralized or decentralized operations and presence or absence of direct access storage). The quantitative workload descriptors are used with cost estimation iso-graphs in the handbook to predict costs, so that proposed cost factors (e.g., man-months of development effort and dollars per month of hardware cost for application production) may be compared with Air Force experience. Both quantitative and qualitative descriptors are used to retrieve relevant information form the 18 system descriptions found in the handbook. The retrieved experience will be used to

check consistency and to uncover potential problems of the proposed ADPS that may be encountered during system development and operation. A primer on the use of this handbook applied to a hypothetical ADPS proposal is published separately as AD-646 866. (Author)
AD-646 863 HC$3.00 MF$0.65

PRIMER FOR AIR FORCE ADP EXPERIENCE HANDBOOK (PILOT VERSION).
Final rept. 16 Feb-15 Dec 66.
Planning Research Corp., Los Angeles, Calif. Information Systems Div.
Dec 66, 81p PRC-R-931
ESD-TR-66-672
Contract AF 19 (628)-5988

Descriptors: (*Data processing systems, Handbooks), Information retrieval, Costs, Classification, Subject indexing, Data storage systems, Computers, Computer personnel, Computer programs, Graphics, Flow charting, Air Force, Management engineering.

The primer illustrates the use of the Air Force ADP Experience Handbook (Pilot Version) published as AD-646 863. The use of the handbook is illustrated by first preparing a sample ADPS proposal and subsequently evaluating the proposal with experience data retrieved from the handbook. The sample ADPS proposal is written to a set of ADPS proposal submission instructions that are advanced as an improvement over existing submission instructions. The ADPS proposal submission instructions are included in the primer for completeness. The sample ADPS proposal is for a Major Air Command Centralized Military Pay System. The proposal is hypothetical in intent and content but has correspondence to a number of existing Air Force systems and procedures. Evaluation of the sample proposal involves first obtaining cost estimates and relevant experience data from the experience handbook. After all experience data relevant to the proposed ADPS has been retrieved, the sample ADPS proposal is evaluated in light of the retrieved data. The data in the pilot version experience handbook used for evaluation of the sample ADPS was based on a sample of 18 existing Air Force ADP Systems. The conclusion of the evaluation is that the proposal should be returned for further study and analysis of certain aspects. (Author)
AD-646 866 HC$3.00 MF$0.65

ON USE OF AIR FORCE ADP EXPERIENCE TO ASSIST AIR FORCE ADP MANAGEMENT. VOLUME I. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS.
Final rept., phase 2, 16 Feb-15 Dec 66,
Planning Research Corp., Los Angeles, Calif. Information Systems Div.
Alan J. Gradwahl, George S. Beckwith, Stanton H. Wong, and Wolford O. Wootan, Jr. Dec 66, 30p PRC-R-932-Vol-1
ESD-TR-66-671-Vol-1
Contract AF 19 (628)-5988
See also AD-646 870 and AD-646 868.

Descriptors: (*Data processing systems, Air Force), Handbooks, Information retrieval, Classification, Subject indexing, Data storage systems, Computers, Computer personnel, Computer programs, Costs, Graphics, Flow charting, Management engineering, Cost effectiveness.

Volume I of the three-volume final report summarizes Phase II of a three-phase project on the Use of Air Force ADP Experience to Assist Air Force ADP Management. The history of the project is traced and the objectives, findings, conclusions, and recommendations are summarized and tabulated. The conclusions are as follows: that sufficient data can be collected to permit macrodescription of an ADPS; relationships do exist between workload descriptors and costs; the information can be distilled and organized into an indexed ADP Experience Handbook; and, for Phase III, an Air Force ADP Management Information System is necessary, feasible, and cost effective. The implementation of Phase III is recommended. (Author)
AD-646 867 HC$3.00 MF$0.65

ON USE OF AIR FORCE ADP EXPERIENCE TO ASSIST AIR FORCE ADP MANAGEMENT. VOLUME III. CONCEPT AND PLAN.
Final rept., phase 2 and 3, 16 Feb-15 Dec 66,
Planning Research Corp., Los Angeles, Calif. Information Systems Div.
Alan J. Gradwohl, and Wolford O. Wootan, Jr.
Dec 66, 124p PRC-R-932-Vol-3
ESD-TR-66-671-Vol-3
Contract AF 19 (628)-5988
See also AD-646 867 and AD-646 870.

Descriptors: (*Data processing systems, Air Force), Handbooks, Information retrieval, Classification, Subject indexing, Data storage systems, Computers, Computer personnel, Computer programs, Costs, Graphics, Flow charting, Management engineering, Cost effectiveness.

Volume III of the three-volume final report on Phase II of a three-phase project on the Use of Air Force ADP Experience to Assist Air Force ADP Management, presents the concept and plan for Phase III. The operational concept for Phase III includes revised procedures for ADPS proposal submission, experience reporting, and asset reporting to an information storage and retrieval system. This system is the nucleus of a management information system that could be operational by June 1968. The major benefits will accrue from improved cost effectiveness and quality of ADP development and operations in the Air Force, from cost and time savings in large system programs that involve ADP. (Author)
AD-646 868 HC$3.00 MF$0.65

ON USE OF AIR FORCE ADP EXPERIENCE TO ASSIST AIR FORCE ADP MANAGEMENT. VOLUME II. ACTIVITIES.
Final rept., phase 2, 16 Feb-15 Dec 66,
Planning Research Corp., Los Angeles, Calif. Information Systems Div.
Alan J. Gradwohl, George S. Beckwith, and Stanton H. Wong. Dec 66, 144p PRC-R-932-Vol-2
ESD-66-671-Vol-2
Contract AF 19 (628)-5988
See also AD-646 867 and AD-646 868.

Descriptors: (*Data processing systems, Air Force), Handbooks, Information retrieval, Classification, Subject indexing, Data storage systems, Computers, Computer personnel, Computer programs, Costs, Graphics, Flow charting, Management engineering, Cost effectiveness.

Volume II of the three-volume final report on Phase II of a three-phase project on the Use of Air Force ADP Experience to Assist Air Force ADP Management is presented. The design of the data collection questionnaire was based on the ADPS model (a concept of a 'total' ADPS) and the workload model representing attributes of an ADPS. Data were collected on a stratified 18-ADPS sample, and the statistical analysis of these data produced five cost estimation equations. In addition, the data were used to produce a seven-page system description of each ADPS, which became the core of the ADP Experience Handbook. A Phase III operational concept and development plan was also synthesized. (Author)
AD-646 870 HC$3.00 MF$0.65

THE PROFESSOR AND THE COMPUTER: 1985,
RAND Corp., Santa Monica, Calif.
B. W. Boehm. Feb 67, 6p P-3527

Descriptors: (*Computers, Predictions).
The scenario reflects the author's belief that extrapolations into the future should point out not only the prospects but also the problems of implementing future technology.
AD-646 880 HC$3.00 MF$0.65

SUBROUTINES FOR IBM SYSTEM/360 TO FACILITATE VISUAL DISPLAY AND MAN-MACHINE RELATIONSHIPS,
Naval Weapons Lab., Dahlgren, Va.
David F. Eliezer. 23 Aug 66, 240p NWL-2074

Descriptors: (*Subroutines, *Display systems), (*Man-machine systems, Subroutines), Graphics, Input-output devices, Programming (Computers), Visual signals.

A group of subroutines is described which facilitates the utilization of the buffered IBM 2250 display terminal associated with an IBM System/360. The routines provide a means of displaying graphs and textual material and provide for efficient use of the light pen and other associated devices. (Author)
AD-646 895 HC$3.00 MF$0.65

THE BASES OF AUTOMATION AND TECHNICAL CYBERNETICS,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 13H.
AD-646 933 HC$3.00 MF$0.65

LAMINATED FERRITE MEMORY, PHASE II FINAL TECHNICAL REPORT, JUN. 1, 1965 - JUN. 30, 1966.
Radio Corp. of America, Princeton, N. J. RCA Labs.
I. Gordon, R. L. Harvey, and A. D. Robbi. Aug 66, 66p NASA-CR-81162
Contract NASW-979

Descriptors: *Ferrite, *Laminated material, *Memory storage unit, Array, Computer, Laminate, Lithium, Magnesium, Manganese, Material, Memory, Stability, Storage, Synthesis, Thermal, Unit, Zinc.

For abstract, see STAR 05 06.
N67-15391 HC$3.00 MF$0.65

RONDVU/ PRESTO - PROGRAM FOR RENDEZVOUS MISSION TRAJECTORY OPTIMIZATION.
Lockheed Missiles and Space Co., Sunnyvale, Calif.
For primary bibliographic entry see Field 22C.
For abstract, see STAR 05 06.
N67-15667 HC$3.00 MF$0.65

FUNCTIONAL REQUIREMENTS FOR SPACEBORNE COMPUTERS ON ADVANCED MANNED MISSIONS.
Bellcomm, Inc., Washington, D. C.
E. L. Gruman, and P. S. Schaenman. 24 Oct 66, 3017p NASA-CR-81237, TM-66-1031-2
Contract NASW-417

Descriptors: *Computer, *Flyby mission, *Manned space flight, *Spacecraft instrumentation, Attitude, Control, Crew, Display, Flight, Flyby, Guidance, Instrumentation, Manned, Mission, Navigation, Planetary, Probe, Simulation, Space, Spacecraft, Training, Unmanned.

For abstract, see STAR 05 06.
N67-15882 HC$3.00 MF$0.65

BIBLIOGRAPHY OF THE COMPUTER CODES LITERATURE EXAMINED BY THE RADIATION SHIELDING INFORMATION CENTER.
Oak Ridge National Lab., Tenn.

For primary bibliographic entry see Field 18F.
For abstract, see STAR 05 06.
N67-16540 HC$3.00 MF$0.65

DIANA - A DIGITAL-ANALOG SIMULATION PROGRAM FOR THE IBM 1620 II COMPUTER.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
R. J. Mankovitz. 1 Feb 67, 35p NASA-CR-81297, JPL-TR-32-1011
Contract NAS7-100

Descriptors: *Computer simulation, *Differential equation, *Ibm 1620 computer, Analog, Computer, Differential, Digital, Equation, Fortran, Program, Simulation, Simultaneous.

For abstract, see STAR 05 06.
N67-16557 HC$3.00 MF$0.65

THEORETICAL AND EXPERIMENTAL RESEARCH ON DIGITAL ADAPTIVE CONTROL SYSTEM FINAL REPORT, 26 MAY 1965 - 25 MAY 1966.
Emerson Electric Co., St. Louis, Mo.
For primary bibliographic entry see Field 9C.
For abstract, see STAR 05 06.
N67-16666 HC$3.00 MF$0.65

A COMPUTER PROGRAM FOR THE ANALYSIS OF GAMMA-RAY SPECTRA BY THE METHOD OF LEAST SQUARES,
Public Health Service, Washington, D. C. Div. of Radiological Health.
For primary bibliographic entry see Field 6R.
PB-173 978 HC$3.00 MF$0.65

REPORT ON A LIBRARY AUTOMATION PROJECT.
Illinois Univ., Urbana.
For primary bibliographic entry see Field 5B.
PB-173 995 HC$3.00 MF$0.65

COMPUTER AIDED CHECKING OF DESIGN DOCUMENTS FOR COMPLIANCE WITH REGULATORY CODES.
Bolt Beranek and Newman, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 13M.
PB-174 095 HC$3.00 MF$0.65

COMPUTER - AIDED COST ESTIMATING TECHNIQUES FOR ARCHITECTS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Architecture.
For primary bibliographic entry see Field 13M.
PB-174 098 HC$3.00 MF$0.65

COMPUTER-ORIENTED NEUTRON DATA STORAGE AND RETRIEVAL SYSTEM,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 04.
UCRL-50132 HC$3.00 MF$0.65

9C. ELECTRONIC AND ELECTRICAL ENGINEERING

NON-LINEAR ANALYSIS OF HETEROPOLAR ELECTROMECHANICAL ENERGY CONVERTERS. PART II. ANALYSIS OF LARGE TURBO-GENERATORS.
Final rept. on phase A,
Colorado Univ., Boulder. Dept. of Electrical Engineering.
Edward A. Erdelyi. Aug 66, 56p
Contract Nonr-1147 (14)
See also AD-646 370.

Descriptors: (*Electromechanical converters, Numerical analysis), Generators, Turbines, Partial differential equations, Iterations, Nonlinear programming, Computer programs.

The analysis presented in this paper using a composite system of coordinates, separation of stator and rotor coordinate systems and a novel scheme of modular programming is well suited for the nonlinear analysis of turbo-generators and other electro-mechanical energy converters in which both members are slotted. The calculated no-load voltages agree quite well with experimental values, considering that the B-H characteristic has plus or minus 15 per cent tolerances on the H scale. (Author)
AD-646 371 HC$3.00 MF$0.65

RANDOM SAMPLING OF RANDOM PROCESSES: MEAN-SQUARE COMPARISON OF VARIOUS INTERPOLATORS.
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
For primary bibliographic entry see Field 12A.
AD-646 488 Not available from CFSTI.

METHOD FOR EXTENSION OF DIELECTRIC CONSTANT AND LOSS MEASUREMENTS OF LIQUIDS TO 100 MHz WITH A FIXED-GEOMETRY SAMPLE HOLDER,
Harry Diamond Labs., Washington, D. C.
Z. G. Sztankay. Nov 66, 30p HDL-TR-1332

Descriptors: (*Dielectric properties, Test methods), (*Liquids, Dielectric properties), Measurement, Q meters, High frequency, Very high frequency.

A method for measuring the dielectric properties of liquid specimens on a Q-meter at frequencies up to 100 MHz was developed by (1) assuming an equivalent circuit for a cylindrically shaped liquid-sample holder, (2) determining relevant circuit parameters by experiment, and (3) deriving the necessary equations taking full account of the effects of sample-holder inductance. Measurements made on two liquid samples are detailed and show that good accuracy is obtained when the standard liquid employed is a lossless dielectric with dielectric constant (K) near the K of the sample under test. (Author)
AD-646 655 HC$3.00 MF$0.65

RESEARCH INVESTIGATION IN TRANSIENT HIGH-POWER PHENOMENA AT MICROWAVE FREQUENCIES.
Raytheon Co., Waltham, Mass. Research Div.
For primary bibliographic entry see Field 20C.
AD-646 776 Not available from CFSTI.

RESEARCH STUDIES OF HIGH-DENSITY PLASMAS.
Illinois Univ., Urbana. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 20I.
AD-646 889 HC$3.00 MF$0.65

RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Progress rept. no. 14, 1 May-31 Oct 66,
Columbia Radiation Lab., New York.
R. Novick. 31 Oct 66, 116p
Contracts DA-28-043-AMC-00099 (E), DA-36-039-sc-90789
See also AD-635 373.

Descriptors: (*Microwaves, Scientific research), (*Atomic spectroscopy, Microwave frequency), (*Molecular spectroscopy, Microwave frequency), (*Solid state physics, Microwaves), (*Radio astronomy, Microwave frequency), Masers, Lasers, Atomic energy levels, Microwave spectroscopy, Excitation, Molecular beams, Nuclear magnetic resonance, Planetary atmospheres, X rays, Telescopes, Phase studies, Ion beams, Helium, Zeeman effect, Lithium, Potassium, Hyperfine structure, Pumping (Optical), Rubidium, Vapors.

Contents: Metastable atoms and ions; Metastable autoionizing atoms; Level-crossing and optical double-resonance spectroscopy; Collision phenomena; Atomic frequency standards; Beam maser spectroscopy; Electron excitation of molecular hydrogen; Scattering of velocity selected molecular beams; Magnetic rotation spectra; Molecular spectra of cesium; Laser studies of molecular birefringence and optical activity; Optical laser spectroscopy of fluids; Interaction between a neutral beam and a conducting surface; Adiabatic demagnetization in the rotating frame; Nuclear magnetic resonance in fine particles; Nuclear double resonance in KClO3; Photon-echo resonance; Brillouin scattering; Models of planetary atmospheres; X-ray polarization; X-ray telescope.
AD-646 898 HC$3.00 MF$0.65

THE DIFFERENCE FREQUENCY COULOMETER.
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
For primary bibliographic entry see Field 22D.
AD-646 903 HC$3.00 MF$0.65

THE IMPROVEMENT OF ENCAPSULATING FOAMS AND QUALITY ASSURANCE OF POTTING PLASTIC.
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
For primary bibliographic entry see Field 11I.
AD-646 915 HC$3.00 MF$0.65

METHODS FOR PERFORMANCE-TESTING OF ELECTROMECHANICAL PRESSURE TRANSDUCERS.
Technical note,
National Bureau of Standards, Washington, D. C.
P. S. Lederer. 9 Feb 67, 37p
Hard copy available from Superintendent of Documents, GPO, Washington, D. C. 20402 $0.25.

Descriptors: (*Performance (Engineering), *Transducers), Calibration, Telemeter systems, Pressure, Environmental tests.

The report describes methods in one particular program at NBS for the performance-testing of electro-mechanical pressure transducers (such as telemetering transducers used in aerospace testing.) It covers static and dynamic calibration procedures in detail, delineates environmental and other tests, and describes the test equipment used. Examples of dynamic calibration results are interpreted. (Author)
NBS-TN-411 HC$0.25 MF$0.65

SYSTEMS AND CONTROLS LABORATORY RESEARCH REPORT.
Pennsylvania State Univ., University Park. Coll. of Engineering.
Oct 66, 44p NASA-CR-80923, RR-4
Contract NGR-39-009-023

Descriptors: *Control system, *Fluid logic, *Hydraulic control, *Jet flow, *Nonlinear system, *Switching, Amplifier, Aspect, Bibliography, Characteristic, Control, Dynamics, Eigenvalue, Element, Flow, Fluid, Hydraulic, Jet, Line, Logic, Model, Motor, Noise, Nonlinear, Nozzle, Performance, Pressure, Ratio, Signal, Spread, Static, Step, System, Theory, Thermal, Transmission.

For abstract, see STAR 05 06.
N67-16061 HC$3.00 MF$0.65

THEORETICAL AND EXPERIMENTAL RESEARCH ON DIGITAL ADAPTIVE CONTROL SYSTEM FINAL REPORT, 26 MAY 1965 - 25 MAY 1966.
Emerson Electric Co., St. Louis, Mo.
E. E. Buder, M. R. Chidambara, R. E. Janitch, R. G. Marsh, and J. Zaborszky. Jan 67, 325p
NASA-CR-669
Contract NAS1-5127

Descriptors: *Adaptive control system, *Digital computer, Adaptive, Analysis, Computer, Control, Digital, Interpolation, Liapunov function, Linear, Mixing, Nonstationary, Plant, Pole, Prediction, Simulation, Stability, Stationary, Statistics, System, Taylor instability, Time, Variance, Volterra equation, Zero.

For abstract, see STAR 05 06.
N67-16666 HC$3.00 MF$0.65

IMPEDANCE BRIDGE MODEL 1650-A (GENERAL RADIO).
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
For primary bibliographic entry see Field 14B.
PB-174 023 HC$3.00 MF$0.65

AC-DC METER CALIBRATOR MODEL 33 (RADIO FREQUENCY LABORATORIES, INC).
Technical manual instrument calibration procedure AQ-40.
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
15 Dec 66, 15p
NAVAIR-17-20AQ-40
Supercedes PB-169 996.

Descriptors: (*Multimeters, *Calibration), Instruction manuals, Test equipment (Electronics), Test methods, Measuring devices (Electrical + electronic).

The procedure describes the calibration of the Model 33 AC-DC Meter Calibrator. The Instrument is a self-contained unit providing accurate av, dv, ac, or dc outputs. (Author)
PB-174 081 HC$3.00 MF$0.65

9D. INFORMATION THEORY

EFFICIENT CODING OF VOCODER CHANNEL SIGNALS USING LINEAR TRANSFORMATION.
Revised ed.,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
W. R. Crowther, and C. M. Rader. 10 Aug 66, 2p
Revision of manuscript submitted 21 Jul 66. Research supported in part by USAF.
Availability: Published in Proceedings of the IEEE v54 n11 p1594-5 Nov 1966.

Descriptors: (*Coding, *Speech), (*Vocoders, Coding), Information theory, Matrix algebra, Transformations (Mathematics), Efficiency, Speech representation, Experimental data.

Experimental coding was tried successfully with two different 16-channel vocoders. The actual encoding was done by a computer in real time. The results are that speech produced by either vocoder with the 1650 bits per second (33 bits per frame) spectrum representation is difficult to distinguish from speech produced with the 4000 bits per second (80 bits per frame) representation. The matrix transformation is easy to implement digitally since it requires only additions and subtractions, and not many of these. It is limited to 16-channel systems although similar matrices exist for 8-channel and 32-channel vocoders. With a high quality spectrum representation using only 1650 bits per second, it should be possible to significantly improve the quality of 2400 bit per second vocoder designs. (Author)
AD-646 471 Not available from CFSTI.

THE EPSILON-ENTROPY AND EPSILON-CAPACITY OF CERTAIN TIME-VARYING CHANNELS,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Reese T. Prosser. 1966, 21p
Availability: Published in Journal of Mathematical Analysis and Applications v16 n3 p553-73 Dec 1966.

Descriptors: (*Information theory, *Operators (Mathematics)), Input-output devices, Functional analysis, Hilbert space, Integral transforms.
Identifiers: Time-varying networks.

The report covers the entropy and capacity of a compact operator, of a Hilbert-Schmidt operator, and of a convolution operator.
AD-646 472 Not available from CFSTI.

DETERMINABLE CLASSES OF CHANNELS,
Michigan Univ., Ann Arbor.
R. T. Prosser, and W. L. Root. 21 Jan 66, 34p
Grant NsG-2-59
Prepared in cooperation with Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Availability. Published in Journal of Mathematics and Mechanics v16 n4 p365-97 1966.

Descriptors: (*Information theory, *Operators (Mathematics)), Hilbert space, Functional analysis, Complex numbers, Signals, Integral transforms.
Identifiers: Time-varying networks.

The paper describes the kind of limitation which must be imposed a priori on a class of signals in order that every signal in the class be distinguishable to within a given mean-square error by a finite number of measurements. Classes of signals which have this property are called determinable classes. It is shown that every bounded determinable class of signals necessarily has a compact closure in the signal space H, and conversely, that every class of signals with compact closure in H is a bounded determinable class. Using this result, various alternative characterizations of bounded determinable classes are given. In particular, every bounded class of signals whose Fourier coefficients in a given orthnormal expansion die out sufficiently fast is a determinable class. Moreover, every bounded class of signals whose 'tails' in both the time and frequency domains die out sufficiently fast is also a determinable class. Conversely, every bounded determinable class of signals must have these properties. Finally, it is noted that every bounded class of signals is determinable if and only if its E-entropy and E-capacity, as defined by Kolmogorov, are finite for each $E > 0$.
AD-646 473 Not available from CFSTI.

A MULTIDIMENSIONAL SAMPLING THEOREM,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Reese T. Prosser. 1966, 12p
Research supported in part by USAF.
Availability: Published in Journal of Mathematical Analysis and Applications v16 n3 p574-84 Dec 1966.

Descriptors: (*Information theory, *Sampling), Integral transforms, Hilbert space, Functional analysis, Theorems.

For some time now it has been a matter of common knowledge and common practice among communications engineers that a signal whose high-frequency components are negligible can be approximately reconstructed from a knowledge of its sample values. The reconstruction requires only that the sample interval be smaller than the reciprocal of the bandwith of the non-negligible frequency components in the signal. Only more recently has the question of how good an approximation can be achieved by this procedure come under scrutiny. It has been quire generally assumed that the mean-square error committed in reconstructing a signal of finite total power from its sample values is proportional to the energy carried in the 'tails' of the signal. Landau and Pollak, in their fundamental paper of 1962, showed however that this assumption is false without further restrictions on the signal. Higher dimensional versions of these results, applicable to signals depending on both time and space variables, have often been assumed but apparently never investigated. This paper provides the proof of a utility theorem giving conditions sufficient to bound the mean-square error committed in reconstructing a signal depending on several variables from its sample values. The theorem shows that under suitable restrictions this error is in fact proportional to the energy carried in the tails of the signal. The precise statement appears as a theorem. The proof is a direct extension of the methods of Landau and Pollak.
AD-646 480 Not available from CFSTI.

RANDOM SAMPLING OF RANDOM PROCESSES: MEAN-SQUARE COMPARISON OF VARIOUS IINTERPOLATORS.
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
For primary bibliographic entry see Field 12A.
AD-646 488 Not available from CFSTI.

GENERATION OF TWO-DIMENSIONAL OPTICAL SPATIAL AUTO- AND CROSS-CORRELATION FUNCTIONS,
Navy Underwater Sound Lab., New London, Conn.
Hans J. Wilde. 13 Dec 66, 40p USL-744

Descriptors: (*Information theory, *Electrooptics), (*Correlators, Electrooptics), Fiber optics, Statistical functions, Correlation techniques, Sonar, Display systems, Underwater tracking, Target recognition.

The report describes the generation of accurate two-dimensional auto- and cross-correlograms as related to optical signal processing. The development and design considerations of a simple electro-optical equipment are outlined and the parameters explained, and the principle of operation is discussed. The report then shows possible applications for sonar displays in the field of target recognition and tracking. The final sections deal with correlograms of small objects and complex images. (Author)
AD-646 554 HC$3.00 MF$0.65

FREQUENCY ASSIGNMENT STUDIES.
Electro Technical Analysis Corp., Tucson, Ariz.
For primary bibliographic entry see Field 17B.
AD-646 613 HC$3.00 MF$0.65

ANALYSIS AND SIMULATION OF WORD-SELECTION PROCEDURES IN ERROR-FREE COMMUNICATION SYSTEMS. PART I. COMPUTER PROGRAMS AND MATHEMATICAL THEORY.
Technical rept.,
New York Univ., N. Y. Lab. for Electroscience Research.
John J. Metzner, and Kenneth C. Morgan. Sep 66, 128p Scientific-5, TR-400-144-Pt-1
AFCRL-66-747-Pt-I
Contract AF 19 (628)-4321

Descriptors: (*Computer programs, *Information theory), (*Communication systems, Feedback), (*Data transmission systems, Information theory), Vocabulary, Selection, Simulation, Mathematical models, Queueing theory.

Three sets of word-selection rules for digital feedback communication systems - a circulating memory procedure, an interlaced memory procedure, and a go-back procedure, were analyzed in a previous report, (AD-621 323). The current report, to be published in two parts, describes a computer simulation and mathematical analysis of these procedures. Part I of this report describes some computer programs which simulate these procedures and presents a mathematical analysis of the effects of certain queuing limitations for the circulating and interlaced memory procedures. Some typical computer-printed records simulating the three transmission procedures also are shown. Part II, to be published separately, will present and evaluate data obtained from the computer simulations. (Author)
AD-646 780 HC$3.00 MF$0.65

A STUDY OF ERROR-CORRECTING CODES, II: DECODABILITY PROPERTIES,
Parke Mathematical Labs., Inc., Carlisle, Mass.
L. K. Arquette, and W. E. Hartnett. Nov 66, 42p
Scientific-9
AFCRL-66-811
Contract AF 19(628)-3826

Descriptors: (*Coding, *Decoding), Errors, Corrections, Mapping (Transformations), Set theory, Information theory.
Identifiers: Error correcting codes.

Decodable error correcting codes and prompt decodable error correcting codes are characterized. New conditions equivalent to correctability are also derived. (Author)
AD-646 875 HC$3.00 MF$0.65

MATHEMATICAL RESEARCH ON CODING THEORY,
Final scientific rept., Feb 64-Nov 66,
Parke Mathematical Labs., Inc., Carlisle, Mass.
Dec 66, 23p
AFCRL-67-0010
Contract AF 19(628)-3826
See also AD-646 875.

Descriptors: (*Coding, *Mathematics), (*Information theory, Coding), Theory, Combinatorial analysis, Probability, Errors, Corrections.
Identifiers: Error correcting codes, Binary coding, Variable length codes.

The report presents a summary of the research performed under the contract in the field of Coding Theory. Since the work performed has been amply documented in the 23 technical memoranda and 9 scientific reports issued and available upon request, this report gives a chronological list of the publications with a summary of and/or comment on their conent. The main effort (represented by 11 technical memoranda and 8 scientific reports) was directed toward an axiomatic theory of error-correcting, variable length codes.
AD-646 876 HC$3.00 MF$0.65

DATA COMPRESSION DEVELOPMENT - A COMPARISON OF TWO FLOATING-APERTURE DATA COMPRESSION SCHEMES.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
J. C. Wilson. 31 Oct 66, 5p
31 Oct. 1966 P 273-278 (See N67-15701 06-11)

Descriptors: *Data compressor, *Information theory, Aperture, Compressor, Data, First, Floating, Information, Order, Processing, Ratio, Sampling, Scheme, Signal, Telemetry, Theory.

For abstract, see STAR 05 06.
N67-15762 HC$3.00 MF$0.65

NONLINEAR CHARACTERISTICS OF PULSE-DURATION MODULATION.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
C. S. Lorens. 15 Feb 67, 13p NASA-CR-81296, JPL-TR-32-1069
Contract NAS7-100

Descriptors: *Pulse code modulation (pcm), *Signal to noise ratio, Analysis, Code, Duration, Error, High strength, Linear, Modulation, Noise, Nonlinear, Power, Pulse, Ratio, Reduction, Sampling, Signal-to-noise.

For abstract, see STAR 05 06.
N67-16560 HC$3.00 MF$0.65

IMP D+E (AIMP) PFM ENCODING SYSTEM INTERFACE DOCUMENT.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
D. C. Lokerson. Aug 66, 78p NASA-TM-X-55653, X-711-66-384
Revision A

Descriptors: *Data processor, *Encoding, *Imp, *Pfm telemetry, *Readout, Analog, Circuit, Data, Description, Design, Digital, Experiment, Fabrication, Format, Frequency, Interface, Interplanetary monitoring platform (imp), Modulation, Output, Processor, Pulse, System, Telemetry, Word.

For abstract, see STAR 05 06.
N67-16674 HC$3.00 MF$0.65

9E. SUBSYSTEMS

PROCESSING NEUROELECTRIC DATA,
Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
For primary bibliographic entry see Field 6E.
AD-218 859 HC$3.00

INTERACTIONS BETWEEN NESTED RHOMBIC ANTENNAS,
National Bureau of Standards, Boulder, Colo.
P. P. Viezbicke. 12 Sep 61, 41p NBS-6773

Descriptors: (*Antennas, Electromagnetic compatibility), Interactions, Antenna radiation patterns, Gain, Performance (Engineering), Measurement.

In order to install as many radiating circuits as possible in a given area, consideration has to be given to the operation of antennas in close proximity to one another. Therefore, mutual coupling between two nested rhombics and the effect of one rhombic on the radiation pattern of the other were measured. For a ratio of antenna sizes of 2 to 1, the presence of either a coplanar or non-coplanar antenna had no influence on the gain and radiation pattern of the reference rhombic. To determine the minimum acceptable separation, measurements were extended to include rhombics almost equal in size and as close as practicable to each other. For wire separations of 0.5 wavelength, the gain of the reference rhombic was reduced by 0.5 db. For 0.2 wavelength separation the gain was reduced by 1 db, and for 0.04 wavelength, by approximately 4 db. Except for very close spacings, the radiation patterns remained substantially unchanged. Mutual coupling, expressed as transmission loss between the antennas in db, varied between -23 and -41 db. (Author)
AD-270 503 HC$3.00

SOME PROPERTIES OF THE ELECTROMAGNETIC FIELD IN A STRATIFIED LAYER,
Ohio State Univ. Research Foundation, Columbus. Antenna Lab.
D. C. Stickler. 15 Nov 64, 71p Rept. no. 1751-6
Contract AF 33(615)-1081
Rept. on Research on Integrated Radome-Scanner Design Techniques.

Descriptors: (*Radomes, Design), Electromagnetic waves, Millimeter waves, Electric fields, Magnetic fields, Permeability (Magnetic), Broadband, Partial differential equations, Boundary layer, Boundary value problems.
Identifiers: Poynting vector.

In connection with the millimeter-wavelength radome design problem, a study was made of the field distribution in an inhomogeneous layer. By examining the poynting vector and two quadratic forms which are closely related to the energy density, some useful properties of the electromagnetic field are determined for a one-dimensionally stratified medium. New expressions are derived for the upper bounds on the moduli of the electric and magnetic field intensities in a medium in which the permittivity and the permeability may vary as a function of one of the rectangular coordinates. Several numerical examples are presented. Not only are these upper bounds simple to calculate, but also they yield more accurate and useful results than the previously available expressions. An estimate is developed for the error involved in the WKB approximation for the field distributions in an inhomogeneous layer, and a numerical example is included. (Author)
AD-453 129 HC$3.00

PLANAR COAXIAL INTERCONNECTION TECHNIQUES.
Quarterly rept. no. 2, 1 Jul-30 Sep 66,
Bunker-Ramo Corp., Canoga Park, Calif. Defense Systems Div.
H. L. Parks, W. Griff, and R. B. Older. Dec 66, 66p F-058
ECOM-02024-2
Contract DA-28-043-AMC-02024 (E)
See also AD-639 068.

Descriptors: (*Circuit interconnections, Manufacturing methods), Etching, Dielectrics, Plastics, Coaxial cables, Epoxy plastics, Halocarbon plastics, Foils, Laminates, Dielectric films, Microminiaturization (Electronics).

A thorough survey of the dielectric material requirements was conducted with attention directed at the field of applicable plastics. Experiments were undertaken with fluorocarbons, such as Teflon FEP film with specially treated surfaces, and a variety of epoxide systems. The application of Teflon was limited as it would be necessary to leave a thin layer of dielectric between the mating lands of the interlayer systems. The use of epoxy materials proved more flexible in their application to coaxial units. Methods for providing an epoxy to the required dielectric areas and their removal from connecting land areas were achieved. The combination of epoxide systems with various modifiers, flexibilizers, and other types of additives served to improve their functional characteristics. A series of experiments was performed to provide center-line conductors for the coaxial systems. The conductor lines were provided on both Teflon and epoxy substrates. Two techniques were utilized, including the foil lamination method and chemical deposition techniques. Control of line definition was more feasible on epoxy substrates. A time-and-method study favored the foil lamination technique on epoxy base materials. The efforts during this quarterly period indicate the feasibility for an epoxide dielectric barrier with a laminated foil method for accomplishing the coaxial conductor system.
AD-646 369 HC$3.00 MF$0.65

A THEORETICAL STUDY OF A MULTI-ELEMENT SCANNING FEED SYSTEM FOR A PARABOLIC CYLINDER.
Revised ed.,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.

R. N. Assaly, and L. J. Ricardi. 19 May 66, 5p
Revision of manuscript submitted 17 Feb 66. Supported by U. S. Air Force.
Availability: Published in IEEE Transactions on Antennas and Propagation vAP14 n5 p601-5 Sep 1966.

Descriptors: (*Antenna feeds, *Phased arrays), Cylindrical bodies, Parabolic antennas, Scanning, Theory, Reflectors, Antenna radiation patterns.

The paper is a theoretical investigation of a method of scanning a beam of an antenna consisting of a fixed reflector and an array of elements illuminating the reflector by appropriately controlling the phase and amplitude of the signal radiating from each element. For the purpose of determining the feasibility of such a system, the two-dimensional problem is explored where a specific antenna geometry and an element radiation pattern are assumed. It was found that although the system exhibits similar performance to a system with a single radiating element when radiating a beam on axis, it could be scanned some eight beamwidths off axis without significant deterioration in characteristics. Interestingly, it was discovered that there is a separation (about 0.7 lambda in this case) between the feed elements where the sidelobes become dramatically high, analogous to grating lobes in a phased array. (Author)
AD-646 491 Not available from CFSTI.

A TECHNIQUE OF FABRICATING INHOMOGENEOUS MEDIA AND THE BEHAVIOR OF A DIPOLE IN SUCH A MEDIUM.
Interim technical rept.,
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
Keigo Iizuka. Dec 66, 41p TR-513
Contract Nonr-1866 (32)

Descriptors: (*Dipole antennas, Radio transmission), (*Test facilities, antennas), Gels, Electrical conductance, Propagation, Environmental tests, Electrical properties.

It is shown that an inhomogeneous medium to be used for antenna experiments can be fabricated using the diffusion profile of NaCl into agar agar. Various problems relating to the construction of a 380 Gallon agar agar tank are described. The production of a desired profile of the electrical properties of the medium is discussed together with the experimentally determined driving-point admittance and current distribution of a dipole antenna when immersed in the inhomogeneous conducting medium. The measured electrical properties of the agar agar when dissolved in tap water are epsilon sub r = 78, tan delta = 0.13 at 114 Mc/s and a conductivity of 0.8 millimhos /cm at 1000 c/s; the diffusion constant D of NaCl into 1.3% agar agar is 0.000008 to 0.00002 sq cm / sec at 25C. The range of change in the loss tangent is large; one profile varied from tan delta = 0.13 to tan delta = 3.3 which corresponds to a factor of twenty six in the distance of a wavelength. The periods of diffusion were one to three weeks. The properties of a dipole antenna measured in an inhomogeneous conducting medium are compared with those in a homogeneous conducting medium. (Author)
AD-646 592 HC$3.00 MF$0.65

SELECTION OF A VLF RECEIVING ANTENNA FOR THE BOLIVIAN SOLAR ECLIPSE SITE.
Research rept.,
Naval Ordnance Lab., Corona, Calif.
V. E. Hildebrand. 31 Oct 66, 42p NOLC-694
Research supported in part by DASA.

Descriptors: (*Solar eclipses, *Ionospheric propagation), (*Loop antennas, Very low frequency), Performance (Engineering), Selection, Antenna radiation patterns.

Properties of the ionosphere D region under conditions of a solar total eclipse were measured utilizing a VLF receiving system in Bolivia. The signals were transmitted from southeast Brazil along the path of totality for the 12 November 1966 solar eclipse. This report describes the study conducted for the selection of a VLF receiving antenna which was to provide maximum discrimination against atmospheric noise in the 9- to 31-kc band. The antenna selected was a two-loop superdirective antenna with the loop elements rotated 25 degrees from the antenna axis. The report describes the criteria utilized in selecting the antenna, discusses other possible choices, and evaluates the performance of the antenna in the light of various component tolerances. (Author)
AD-646 629 HC$3.00 MF$0.65

CONTROL AND MEASUREMENT OF ANTENNA POLARIZATION.
Memorandum rept.,
Naval Research Lab., Washington, D. C.
P. J. Allen. Jul 66, 44p NRL-MR-1734

Descriptors: (*Antennas, Polarization), Measurement, Control systems, Radio waves, Effectiveness.

The effectiveness of an antenna in receiving a polarized wave is very dependent upon the state of polarization of both the antenna and of the wave being received. While the degree of coupling between wave and antenna, or between two antennas, can be determined theoretically, a qualitative appreciation of how antennas and polarized waves interact often is more helpful in understanding the observed performance. Conceptual analysis of a polarization situation usually can be greatly simplified by considering it in terms of the circularly polarized components involved. The utility of this approach is illustrated in a discussion of variously polarized waves, and the use of circularly-bipolarized antennas for controlled polarization diversity. The concept of 'intrinsic polarization' is introduced to simplify situations involving relative rotation of source and receiving antenna. Methods are discussed for measuring the polarization characteristics of antennas in terms of the sense, axial ratio, and orientation of the radiated wave. Various types of polarization resolvers and polarimeters used for this purpose are described. (Author)
AD-646 713 HC$3.00 MF$0.65

THE DIFFERENTIATOR CIRCUIT.
Picatinny Arsenal, Dover, N. J. Ammunition Group.
For primary bibliographic entry see Field 14B.
AD-646 722 HC$3.00 MF$0.65

SYNTHESIS OF TIME-VARYING PASSIVE NETWORKS.
Technical rept.,
Stanford Univ., Calif. Stanford Electronics Labs.
B. D. O. Anderson. Mar 66, 95p TR-6560-7, SU-SEL-66-099
Contract Nonr-225 (83), Grant AF-AFOSR-337-63

Descriptors: (*Electrical networks, *Mathematical models), Matrix algebra, Synthesis, Time.

The investigation was concerned with the replacement of physical entities by models, upon which calculations may be performed; often the aim is to interpret physical conditions of the physical entity as mathematical conditions on some part of a mathematical model, or vice versa. The physical entities considered were time-varying electrical networks, which were often assumed to be imbued with physical properties such as linearity, passivity, and finiteness, all properties well known in more classical studies; the mathematical models considered were principally described by network matrices, such as the scattering matrix or impedance matrix. One aim was necessary, sufficient, or necessary and sufficient conditions on a scattering matrix for the associated network to be linear, or passive, or finite, or to possess any combination of these and other properties. The principal aim was means for passing from the network to a matrix description (analysis), and means for passing from a matrix to the network (synthesis).
AD-646 725 HC$3.00 MF$0.65

INTEGRATED LOGIC NETS.
Final rept., 1 Jul 64-30 Nov 66,
RCA Labs., Princeton, N. J.
Frederick P. Heiman. Jan 67, 33p
AFCRL-67-0006
Contract AF 19 (628)-4208

Descriptors: (*Integrated circuits, *Computer logic), (*Transistors, Integrated circuits), Logic circuits, Silicon, Films, Circuit interconnections, Computer storage devices, Single crystals, Sapphires, Substrates, Vapor plating.
Identifiers: Metal oxide semiconductors.

The use of thin single-crystal silicon films deposited on single-crystal sapphire has yielded the most promising solution to the fabrication of complex complementary-MOS transistor integrated circuits. High-performance 10-transistor memory cells exhibiting a switching speed of less than 12 nsec at a power dissipation of 10 microwatts have been fabricated on thin silicon films. In addition, a 90-transistor word cell has been fabricated which dissipates only 90 microwatts for the entire circuit. The fabrication of both N- and P-channel transistors on a bulk silicon substrate has been accomplished through use of a composite wafer in which alternate bars of P- and N-type silicon are isolated by a thick layer of silicon dioxide. In addition, a two-wafer scheme involving a novel face-to-face soldering technique has provided an alternate approach to fabricating complementary-MOS transistor circuits. The technology necessary to yield a low-capacitance two-level intraconnection scheme has been developed, which allows the use of most vacuum-deposited dielectrics for the insulating layer; chemical etching of this layer is not necessary due to a novel technique used to introduce small holes in the insulating layer. (Author)
AD-646 726 HC$3.00 MF$0.65

UTILIZATION OF THE RECIPROCITY THEOREM TO DETERMINE THE NEAR FIELD AIR-TO-SUBSURFACE PROPAGATION FORMULAS.
Navy Underwater Sound Lab., New London, Conn.
For primary bibliographic entry see Field 20N.
AD-646 855 HC$3.00 MF$0.65

IMPROVED ATC TRANSPONDER ANTENNA PERFORMANCE.
Technical rept.,
Federal Aviation Agency, Washington, D. C. Systems Research and Development Service.
Kenneth Wise. Dec 66, 22p FAA-RD-66-103

Descriptors: (*Aircraft antennas, Transponders), (*Air traffic control systems, Antennas), Performance (Engineering), Radar beacons, Antenna configurations.

The document describes the results of a study to determine the best way to improve the performance of the ATC transponder antenna. The background of the problem is presented and the advantages and disadvantages of some of the many solutions, past and present, are discussed. A strong recommendation is made for a combined transponder/antenna system approach as the solution to the problem. The details of the proposed approach are presented in the form of an engineering requirement suitable for development effort. (Author)
AD-646 877 HC$3.00 MF$0.65

RADAR BEACON SYSTEM AND ANTENNA EVALUATION PROGRAM FOR SD-1 DRONES. VOLUME I.
Radioplane Co., Van Nuys, Calif.
For primary bibliographic entry see Field 17I.
AD-646 905 HC$3.00 MF$0.65

RADAR BEACON SYSTEM AND ANTENNA EVALUATION PROGRAM FOR SD-1 DRONES. APPENDIX, VOLUME II.
Radioplane Co., Van Nuys, Calif.
For primary bibliographic entry see Field 17I.
AD-646 906 HC$3.00 MF$0.65

THE SERIES-FED, LOG-PERIODIC FOLDED DIPOLE ARRAY.
Final technical rept. no. 5, 1 Jun 62-31 Aug 63, Illinois Univ., Urbana. Dept. of Electrical Engineering.
K. G. Balmain, and J. D. Dyson. Jan 64, 19p
Research supported in part by Navy Electronics Lab., San Diego, Calif.

Descriptors: (*Dipole antennas, Log periodic antennas), Antenna arrays, Antenna radiation patterns, Printed circuits, Electrical impedance, Gain.

The antenna described is a new type of unidirectional, plane-polarized, log-periodic antenna array in which the elements are folded dipoles connected in series with the wires of a feeder. In comparison with similar arrays of straight dipoles, the models tested exhibit smaller maximum width, higher directivity and higher impedance. However, construction of the folded dipole array is considerably more difficult due to the shape and required dimensions of the folded elements. (Author)
AD-646 912 HC$3.00 MF$0.65

METAL-OXIDE-SEMICONDUCTOR FIELD-EFFECT TRANSISTORS IN DIGITAL CIRCUITS.
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
For primary bibliographic entry see Field 9A.
AD-646 914 HC$3.00 MF$0.65

ELEMENTS AND DRIVES OF POWER FOLLOW-UP SYSTEMS: COLLECTION OF ARTICLES.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 13I.
AD-646 932 HC$3.00 MF$0.65

A PROPOSAL FOR A VERY LARGE ARRAY RADIO TELESCOPE. VOLUME II. SYSTEMS DESIGN.
National Radio Astronomy Observatory, Green Bank, W. Va.
Jan 67, 272p
Research supported by NSF. See also PB-173 912.

Descriptors: (*Radio telescopes, *Systems engineering), Delay lines, Computers, Antenna arrays, Amplifiers, Site selection, Correlators, Electrical networks, Oscillators.

Concerns the design, construction and operation of a large radio telescope system for research in radio astronomy and covers the following: Content: The System Design; The Antenna Element; Site Development; Electronics System; Local Oscillator System; Receiver Front-Ends; IF Transmission System; Delay Line System; Correlator System; System Reliability and Maintenance; The Computer System for the VLA; Spectral Line System. (Author)
PB-173 913 HC$3.00 MF$0.65

A QUASILOSSLESS TIME-VARIABLE SYNTHESIS SUITABLE FOR INTEGRATED CIRCUITS.
Technical rept.,
Stanford Univ., Calif. Stanford Electronics Labs.
R. W. Newcomb. Oct 66, 25p SU-SEL-66-101
Grants NSF-GK-237, F-44620-67-C-0001

Descriptors: (*Integrated circuits, Mathematical models), Synthesis, Time, Capacitors, Admittance, Phase shifters, Electrical networks.

Using a method of grounded gyrator imbedding of capacitors a synthesis of (passive) quasilossless impulsive admittances is given. The method uses a minimum number of capacitors, all of which are grounded, though a more rigorous proof of this minimality would be desirable for the time-variable case. All capacitors which are time-invariant, are assumed equal for the convenience of integrated circuit designs; however, any nonzero values can be obtained without any structural change by straightforward denormalization.
PB-174 084 HC$3.00 MF$0.65

9F. TELEMETRY

TELEMETRY RING ANTENNA.
Harry Diamond Labs., Washington, D. C.
Howard Bassen, and Ronald Jantz. Dec 66, 21p
HDL-TR-1335

Descriptors: (*Telemetering antennas, Rings), (*Fuze functioning elements, Telemetering antennas), Projectile fuzes, Projectiles.

A quarter-wavelength ring antenna was developed to telemeter active fuzes in flight with a minimum modification to fuze or artillery round. Using principles of strip transmission line theory, general design criteria were established to maximize radiation efficiency within a fixed form factor. Electroplating and selective machining provided for economical, accurate production. Antenna field strength measurements verified expectations as to adequate radiation efficiency and a highly symmetric, ring-shaped pattern. This type antenna provides the ability, for the first time, to telemeter in-flight active fuzes without major shell modification. (Author)
AD-646 762 HC$3.00 MF$0.65

THE DIFFERENCE FREQUENCY COULOMETER.
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
For primary bibliographic entry see Field 22D.
AD-646 903 HC$3.00 MF$0.65

METHODS FOR PERFORMANCE-TESTING OF ELECTROMECHANICAL PRESSURE TRANSDUCERS.
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 9C.
NBS-TN-411 HC$0.25 MF$0.65

INSTRUCTION MANUAL FOR THE HRIR MODIFICATIONS TO THE APTS GROUND STATIONS USING FAIRCHILD FACSIMILE RECORDERS.
Radio Corp. of America, Princeton, N. J. Astro-electronics Div.
10 Jan 66, 72p NASA-CR-81182, AED-M-2069
Contract NAS5-667

Descriptors: *Automatic picture transmission (apt), *Infrared instrument, *Installation manual, Automatic, Drawing, Ground station, High resolution, Infrared, Installation, Instruction, Instrument, Manual, Nimbus satellite, Operation, Picture, Recorder, Signal, Transmission.

For abstract, see STAR 05 06.
N67-15524 HC$3.00 MF$0.65

SPACE PROGRAMS SUMMARY NO. 37-42, VOLUME III FOR THE PERIOD SEPTEMBER 1, 1966 TO OCTOBER 31, 1966. DEEP SPACE NETWORK.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
30 Nov 66, 138p NASA-CR-81209, JPL-SPS-37-42, VOL. III
Contract NAS7-100

Descriptors: *Deep space, *Instrumentation program, *Navigation and guidance, *Radio communication, *Space station, *Spacecraft tracking, Acceleration, Antenna, Calibration, Communication, Control, Deep, Digital, Doppler effect, Engineering, Entry, Facility, Frequency, Generation, Guidance, Instrumentation, Mars, Matrix, Navigation, Network, Noise, Orbit, Pioneer project, Program, Radio, S-band, Space, Spacecraft, Station, Thermal, Tracking, Venus, X-band.

For abstract, see STAR 05 06.
N67-15901 HC$3.00 MF$0.65

BIPOLAR ANALOG TO PULSE WIDTH CONVERTER.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
R. H. Nixon. 15 Jan 67, 23p NASA-CR-81252, JPL-TR-32-1034
Contract NAS7-100

Descriptors: *Analog-to-digital converter, *Pulse width amplitude converter, Amplitude, Analog, Biosatellite, Circuit, Converter, Digital, Electric, Environment, Geophysical satellite, Logic, Mariner spacecraft, Mechanical, Noise, Pulse, Spacecraft, System, Width.

For abstract, see STAR 05 06.
N67-16057 HC$3.00 MF$0.65

INFLUENCE OF DATA TYPE AND RATE ON SHORT ARC LUNAR ORBIT DETERMINATION.
TRW Systems, Redondo Beach, Calif.
For primary bibliographic entry see Field 22C.
For abstract, see STAR 05 06.
N67-16573 HC$3.00 MF$0.65

REVIEW OF A DSIF DATA TAKING AND ORBIT DETERMINATION METHOD.
TRW Systems, Redondo Beach, Calif.
For primary bibliographic entry see Field 22C.
For abstract, see STAR 05 06.
N67-16574 HC$3.00 MF$0.65

AN EXPERIMENTAL STUDY OF THE DIPOLE ANTENNA WITH NONREFLECTING RESISTIVE LOADING.
Harvard Univ., Cambridge, Mass. Gordon Mckay Lab.
L.-C. Shen. Sep 66, 65p NASA-CR-81331, SR-7
Grant NSG-579

Descriptors: *Current distribution, *Dipole antenna, *Radiation field, Admittance, Amplitude, Antenna, Current, Cylinder, Dipole, Distribution, Field, Impedance, Input, Loading, Nonreflection, Pattern, Radiation, Resistivity.

For abstract, see STAR 05 06.
N67-16634 HC$3.00 MF$0.65

ADVANCED THRESHOLD REDUCTION TECHNIQUES STUDY.
ADCOM, Inc., Cambridge, Mass.
C. A. Filippi. Jan 67, 140p NASA-CR-682
Contract NAS5-9011

Descriptors: *Feedback frequency modulation (fbfm), *Frequency compression demodulator,

*Phase lock demodulator, *Signal analysis, Analysis, Band, Compression, Cycle, Demodulator, Design, Divider, Feedback, Frequency, Improvement, Lock, Loop, Modulation, Noise, Optimum, Order, Phase, Sawtooth, Second, Signal, Sinusoid, Slip, Third, Threshold.

For abstract, see STAR 05 06.
N67-16665 HC$3.00 MF$0.65

A SPACE COMMUNICATIONS STUDY FINAL REPORT, SEP. 15, 1965 - SEP. 15, 1966.
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 17B.
For abstract, see STAR 05 06.
N67-16698 HC$3.00 MF$0.65

MINIATURIZED RADIOTELEMETRY DEVICE FOR MONITORING TEMPERATURES.
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
E. W. Pipes. 13 Dec 66, 42p
Contract W-7405-eng-26

Descriptors: (*Telemeter systems, Miniature electronic equipment), Temperature, Monitors, Telemetering data.

For abstract, see NSA 21 04.
Y-1568 HC$3.00 MF$0.65

10. ENERGY CONVERSION (NON-PROPULSIVE)

10A. CONVERSION TECHNIQUES

THE PERFORMANCE OF RUTHENIUM AS AN ELECTRODE IN A THERMIONIC CONVERTER.
Martin Co., Baltimore, Md.
A. J. Kennedy, and D. S. Trimmer. 1964, 8p
Contract Nonr-3639 (00)

Descriptors: (*Thermionic converters, Electrodes), (*Ruthenium, Thermionic converters), Thermionic emission, Performance (Engineering), High-temperature research, Energy conversion, Cesium, Liquid metals, Plasma jets, Flame spraying.

Ruthenium, a material having relatively low adsorption cross section in both thermal and epithermal regions of the neutron spectra, was investigated as an emitter and as a collector in a thermionic converter. Both hot pressed and plasma sprayed ruthenium emitters behave like high vacuum work function materials, i.e., display high output current density at relatively low cesium pressures. Significant differences are noted, however, in the performance of the two ruthenium emitters prepared by the different processes. The performance is compared to that of iridium and rhenium, the ruthenium showing generally a higher output power density, particularly at moderate (10 to 30 mil) values of interelectrode gap. A plasma sprayed ruthenium collector assumes its optimum at a temperature approximately 100K lower than that for a molybdenum collector, the value of collector work function at optimum being the same, within the limits of experimental uncertainty, for the two materials. (Author)
AD-465 704 HC$3.00 MF$0.65

NON-LINEAR ANALYSIS OF HETEROPOLAR ELECTROMECHANICAL ENERGY CONVERTERS. PART II. ANALYSIS OF LARGE TURBOGENERATORS.
Colorado Univ., Boulder. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 9C.
AD-646 371 HC$3.00 MF$0.65

EFFECT OF THE CLEARANCES BETWEEN THE CASTING AND THE WHEEL UPON THE EFFICIENCY OF THE CENTRIPETAL GAS TURBINE.
National Aeronautics and Space Administration, Washington, D. C.
A. YE.Zaryankin, and M. F. Zatsepin. Dec 66, 12p NASA-TT-F-10450
Transl. Into English From Energomashinostr. (Moscow), No. 3, 1964 P 33-35

Descriptors: *Centripetal force, *Gas turbine, *Turbine wheel, Casing, Centripetal, Clearance, Effect, Efficiency, Flow, Force, Formula, Gas, Input, Output, Rate, Turbine, Wheel.

For abstract, see STAR 05 06.
N67-15691 HC$3.00 MF$0.65

ON FRICTION AND LEAKAGE LOSSES IN THE WORKING BLADE-RINGS OF RADIAL-FLOW TURBINES IN HELICOPTER AND TRANSPORT GAS-TURBINE UNITS.
O Poteryakh Treniya I Ventilyatsii V Rabochikh Ventsakh Radial'nykh Turbin Vertoletnykh I Transportnykh Gtu
National Aeronautics and Space Administration, Washington, D. C.
N. F. Galitskiy. Jan 67, 12p NASA-TT-F-447
Transl. Into English From Izv. Vyssh. Ucheb. Zaved., Aviats. Tekh. (Kazan), V. 7, No. 4, 1964 P 60-66

Descriptors: *Energy loss, *Helicopter, *Turbine blade, Blade, Energy, Flow, Gas, Loss, Operation, Power, Radial, Ring, Transport, Turbine, Unit, Working.

For abstract, see STAR 05 06.
N67-15940 HC$3.00 MF$0.65

STUDY OF THIN DIELECTRIC FILMS FOR THERMO-DIELECTRIC ENERGY CONVERSION QUARTERLY REPORT, 1 MAR. - 31 MAY 1966.
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 20L.
For abstract, see STAR 05 06.
N67-16510 HC$3.00 MF$0.65

RESEARCH AND DEVELOPMENT IN CD S PHOTOVOLTAIC CELLS FINAL REPORT, 28 JUN. 1965 - 27 JUN. 1966.
Harshaw Chemical Co., Cleveland, Ohio.
T. A. Griffin, E. R. Hill, and J. C. Schaefer. 27 Jun 66, 82p NASA-CR-72144
Contract NAS3-7631

Descriptors: *Cadmium sulfide, *Photovoltaic cell, *Solar cell, *Thin film, Bulk, Cadmium, Capacitance, Cell, Collector, Current, Environment, Film, Grid, Hysteresis, Model, Photovoltaic, Property, Response, Solar, Spectral, Sulfide, Surface, Temperature, Test, Thin, Transport, Treatment, Vapor, Variation, Voltage.

For abstract, see STAR 05 06.
N67-16562 HC$3.00 MF$0.65

STUDY OF ASBESTOS FOR ELECTROCHEMICAL CELLS FIRST SUMMARY REPORT.
TRW Equipment Labs., Cleveland, Ohio.
J. W. Vogt. 28 Dec 66, 66p NASA-CR-72148
Contract NAS3-8522

Descriptors: *Asbestos, *Electrochemical cell, *Fuel cell, *Material testing, *Test program, Board, Cell, Chemical, Degradation, Dry, Electrochemical, Electrolyte, Fiber, Fuel, Hydroxide, Inorganic, Mat, Material, Matrix, Paper, Potassium, Program, Property, Separator, Surface, Test, Testing, Wetness.

For abstract, see STAR 05 06.
N67-16563 HC$3.00 MF$0.65

TURBINE RESEARCH PACKAGE FOR RESEARCH AND DEVELOPMENT OF HIGH PERFORMANCE AXIAL FLOW TURBINE-COMPRESSOR FINAL REPORT.
Pratt and Whitney Aircraft, East Hartford, Conn.
R. Cohen, W. K. Gilroy, and F. D. Havens. Dec 66, 74p NASA-CR-54883, PWA-2822
Contract NAS3-4179

Descriptors: *Axial flow turbine, *Brayton cycle, *Compressor efficiency, *Performance characteristics, Acceptance, Aerodynamic, Axial, Characteristics, Compressor, Design, Development, Distribution, Dynamic, Efficiency, Engineering, Flow, Gas, Mechanical, Operation, Package, Performance, Research, Rotor, Testing, Thermodynamic, Turbine, Turbomachine, Velocity.

For abstract, see STAR 05 06.
N67-16565 HC$3.00 MF$0.65

THERMODYNAMIC AND TURBINE CHARACTERISTICS OF HYDROGEN-FUELED OPEN-CYCLE AUXILIARY SPACE POWER SYSTEMS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
M. R. Vanco. Jan 67, 27p NASA-TM-X-1337
Contract 128-31-02-25-22

Descriptors: *Auxiliary power source, *Gas turbine, *Spacecraft power supply, *Thermodynamic property, Auxiliary, Blade, Characteristics, Consumption, Cycle, Flow, Fuel, Gas, Hydrogen, Open, Power, Propellant, Property, Ratio, Source, Spacecraft, Stress, Supply, System, Thermodynamic, Turbine.

For abstract, see STAR 05 06.
N67-16679 HC$3.00 MF$0.65

COMPUTER PROGRAM FOR THERMODYNAMIC PERFORMANCE OF BRAYTON-CYCLE SPACE-POWER SYSTEMS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A. J. Glassman. Jan 67, 27p NASA-TM-X-1339
Contract 128-31-02-25-22

Descriptors: *Brayton cycle, *Fortran, *Spacecraft power supply, *Thermodynamic efficiency, Characteristics, Component, Coolant, Cycle, Efficiency, Flow, Performance, Power, Radiator, Ratio, Shaft, Spacecraft, Supply, Temperature, Thermodynamic, Turbine, Turbomachine, Variation.

For abstract, see STAR 05 06.
N67-16680 HC$3.00 MF$0.65

EXPERIMENTAL PERFORMANCE EVALUATION OF A 6.02-INCH RADIAL-INFLOW TURBINE OVER A RANGE OF REYNOLDS NUMBER.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
S. M. Futral, Jr., and D. E. Holeski. Jan 67, 23p NASA-TN-D-3824
Contract 120-27-03-13-22

Descriptors: *Inlet pressure, *Reynolds number, *Turbine, Argon, Efficiency, Inflow, Inlet, Power, Pressure, Radial, Space, System, Viscosity.

For abstract, see STAR 05 06.
N67-16694 HC$3.00 MF$0.65

PROPOSITIONS POUR LE MECHANISME D'ECHAUFFEMENT D'UN CORPS PAR BOMBARDEMENT ELECTONIQUE (Proposals for the Heating Mechanism of an Electronically Bombarded Body),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 20H.
PB-174 038 HC$3.00 MF$0.65

10B. POWER SOURCES

THE EFFECTS OF PARTIAL CONDENSATION AROUND IONS IN ELECTRIC FLUID DYNAMIC ENERGY CONVERSION PROCESSES.
Final rept. Oct 63-Mar 64,
Aerospace Research Labs., Wright-Patterson AFB, Ohio.
John A. Decaire. Sep 66, 57p ARL-66-0187
Masters thesis.

Descriptors: (*Plasma generators, Electric fields), Electrical properties, Energy conversion, Nozzles, Effectiveness, Condensation, Ions, Power supplies, Electric discharges, Nucleation.
Identifiers: Electrohydrodynamic generators.

Fluid dynamic energy is converted directly into electrical energy -- unipolar charges are seeded into a gas flow and are transported by viscous interaction with the gas molecules to an electrode of high potential. The effectiveness of the viscous coupling depends on the charge mobility being greatly increased when colloid sized particles rather than molecular ions are used as the charge carriers. The mobility of charged colloids is discussed theoretically. Negative ions are produced by a corona discharge from a needle placed along the axis of a nozzle. A dense air-vapor mixture is expanded through the nozzle. The vapor condense around the ions forming charged droplets. Water and carbon tetrachloride vapors are tested. The current and power outputs of the test generator are greatly increased over the corresponding performance when ions are the charge carriers - current increases are about a factor 4 and power increases about one order of magnitude. The observed results are in good agreement with the theory. (Author)
AD-646 740 HC$3.00 MF$0.65

A FUNCTIONALLY-INTEGRATED CONTROLLER- COMMUTATOR FOR USE IN BRUSHLESS DIRECT-DRIVE SOLAR ARRAY REORIENTATION SYSTEMS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
L. J. Veillette. Sep 66, 54p NASA-TM-X-55641, X-716-66-473

Descriptors: *Commutator, *Sensor, *Spacecraft guidance, Control, Damping, Earth satellite, Guidance, Integration, Magnetic, Spacecraft, Speed, Torque.

For abstract, see STAR 05 06.
N67-16544 HC$3.00 MF$0.65

DEVELOPMENT OF AN IMPROVED OXYGEN ELECTRODE FOR USE IN ALKALINE H2-O2 FUEL CELLS QUARTERLY REPORT, OCT. 1 - DEC. 31, 1966.
Bureau of Mines, Pittsburgh, Pa. Coal Research Center.
S. Akhtar, D. Bienstock, and C. T. Grein. 31 Dec 66, 17p NASA-CR-81337, Q-2
NASA ORDER W-12300

Descriptors: *Chemical reaction, *Hydrox fuel cell, *Transition element, Boron, Carbon, Cell, Chemical, Cobalt, Compound, Electrode, Element, Fuel, Hydrox, Interstitial, Iron, Nickel, Nitrogen, Preparation, Reaction, Silicon, Silver, Synthesis, Transition.

For abstract, see STAR 05 06.
N67-16628 HC$3.00 MF$0.65

10C. ENERGY STORAGE

THE ELECTROCHEMICAL AND DISSOLUTION PROPERTIES OF NICKEL OXIDE.
Western Reserve Univ., Cleveland, Ohio. Dept. of Chemistry.
For primary bibliographic entry see Field 7D.
AD-646 456 HC$3.00 MF$0.65

FC-2 LIQUID AMMONIA RESERVE BATTERY: STATUS OF PROTOTYPE STUDY,
Naval Ordnance Lab., Corona, Calif.
John C. Daley. 1 Nov 66, 61p NOLC-655

Descriptors: (*Primary cells, Ammonia), Performance (Engineering), Liquids, Batteries + components, Electrochemistry, Electric discharges, Electrodes, Energy conversion, Gas generating systems, Nitrobenzenes, Anodes (Electrolytic cell), Cathodes (Electrolytic cell), Lithium, Magnesium, Organic nitrogen compounds.

An investigation was made of the use of the FC-2 Liquid Ammonia Prototype Battery for short-life reserve primary battery applications. The completely self-contained unit, in a volume of 90 cu cm (5.5 cu in.), proved capable of operating for 5 min at a nominal 28 V, 1 A. Performance was satisfactory under simulated missile environments, including shock, vibration, spin, and temperature (-54 to +74C or -65 to +165F). An organic oxidant, m-dinitrobenzene (mDNB), is used as the cell cathode, and the reserve activation feature is provided by storing the electrolyte solvent, anhydrous liquid ammonia, in a separate compartment of the battery case. The basic electrochemical system is Mg/KSCN/NH4SCN-mDNB-C/stainless steel (Type 302). The measured volume enersity of this model for a 5 min discharge is 54 J/cu cm (0.1 Wh/cu in.), and weight enersity is 20 J/g (2.5 Wh/lb). (Author)
AD-646 636 HC$3.00 MF$0.65

THE DIFFERENCE FREQUENCY COULOMETER.
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
For primary bibliographic entry see Field 22D.
AD-646 903 HC$3.00 MF$0.65

ELECTROCHEMICAL CHARACTERIZATION OF SYSTEMS FOR SECONDARY BATTERY APPLICATION SECOND QUARTERLY REPORT, AUG. - OCT. 1966.
Whittaker Corp., San Diego, Calif. Narmco Research and Development Div.
For primary bibliographic entry see Field 7D.
For abstract, see STAR 05 06.
N67-15831 HC$3.00 MF$0.65

RESEARCH INTO FUNDAMENTAL PHENOMENA ASSOCIATED WITH SPACECRAFT ELECTROCHEMICAL DEVICES--CALORIMETRY OF NICKEL-CADMIUM CELL PROGRESS REPORT, JAN. 1 - SEP. 30, 1966.
American Univ., Washington, D. C.
R. T. Foley, and W. H. Webster. 30 Sep 66, 96p NASA-CR-81350, PR-1
Contract NAS5-10105

Descriptors: *Calorimeter, *Isothermal flow, *Nickel-cadmium battery, *Thermal cycling, Battery, Cadmium, Calibration, Characteristic, Continuous, Cycling, Discharge, Flow, Isotherm, Nickel, Orbital, Oxygen, Pressure, Response, Thermal.

For abstract, see STAR 05 06.
N67-16609 HC$3.00 MF$0.65

RESEARCH AND DEVELOPMENT OF CELLS WITH BELLOWS CONTROLLED ELECTROLYTE LEVELS FINAL PROGRESS REPORT, MAY 11, 1965 - APR. 1, 1966.
Electric Storage Battery Co., Raleigh, N. C. Missile Battery Div.
A. M. Chreitzberg, and F. S. Cushing. 1 Apr 66, 82p NASA-CR-81380, E-13-66
Contract NAS5-3813

Descriptors: *Bellows, *Electrolyte, *Nickel-cadmium battery, Battery, Cadmium, Cavity, Cell, Charge, Control, Drainage, Hardware, Nickel, Oxygen, Pressure, Recombination, Silver.

For abstract, see STAR 05 06.
N67-16697 HC$3.00 MF$0.65

11. MATERIALS

11A. ADHESIVES AND SEALS

GLUING AMMONIUM - SALT - TREATED SOUTHERN PINE WITH RESORCINOL-RESIN ADHESIVES.
Forest Products Lab., Madison, Wis.
For primary bibliographic entry see Field 11L.
AD-646 565 HC$3.00 MF$0.65

EXTRAVEHICULAR SPACE ADHESIVE SYSTEM.
National Cash Register Co., Dayton, Ohio.
For primary bibliographic entry see Field 22A.
AD-646 659 HC$3.00 MF$0.65

11B. CERAMICS, REFRACTORIES, AND GLASSES

MASONRY TESTING: A BIBLIOGRAPHY,
California Univ., Los Angeles. Dept. of Engineering.
Louise Gray. Nov 57, 139p Rept. no. 57-47

Descriptors: (*Ceramic materials, Bibliographies), Concrete, Construction, Brick, Cements, Clay, Materials, Reinforced concrete.
AD-147 969 HC$3.00

RESEARCH TO DETERMINE THE MECHANISMS CONTROLLING THE BRITTLE-DUCTILE BEHAVIOR OF REFRACTORY CUBIC CARBIDES.
Rept. for 1 Jan-31 Dec 63,
Union Carbide Corp., Parma, Ohio. Research Lab.
Wendell S. Williams, and Robert G. Lye. Mar 64, 79p
AFML-TDR-64-25
Contract AF 33 (657)-10109

Descriptors: (*Refractory metal alloys, Carbides), (*Crystal structure, Electrical properties), Titanium alloys, Niobium alloys, Zirconium alloys, Creep, Deformation, Single crystals, Brittleness, Temperature, Laboratory furnaces, Resistance (Electrical), Hall effect, Crystal lattices, Ductility, Magnetic properties.
Identifiers: 1964, Seebeck effect, Niobium carbide, Titanium carbide, Zirconium carbide.

Plastic flow at high temperatures in single crystals of the transition metal monocarbides has been studied by determining the influence of temperature, strain rate, surface condition, and carbon/metal ratio on the compressive yield stress. Yielding in the carbides is apparently controlled by lattice friction. A study of the influence of carbon vacancies on the resistivity, P, and Hall coefficient

of TiC has shown that the added resistivity/atomic per cent vacancies is 16 milliohm cm and that the value of P for stoichiometric TiC is 70 = 10 milliohm cm. Literature values for magnetic susceptibility and Hall coefficient of TiC, and new measurements of its Seebeck coefficient, are discussed in terms of a plausible band structure. The possibility of a transfer of electrons from carbon to titanium atoms is suggested, and the implications of the resulting ionic character are discussed for the elastic moduli and the cohesive energy. (Author)
AD-434 108 HC$3.00

HIGH PRESSURE SYNTHESIS OF ARSENOPYRITE-TYPE TERNARY COMPOUNDS,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
For primary bibliographic entry see Field 7B.
AD-646 477 Not available from CFSTI.

HIGH VISCOSITY THERMAL PROTECTION MATERIALS.
Summary rept., 30 Jun 65-30 Jun 66,
Naval Ordnance Lab., White Oak, Md.
Roger E. Wilson, and D. M. Caum. 16 Dec 66, 35p NOLTR-66-213

Descriptors: (*Refractory materials, Processing), (*Tungsten, Refractory materials), (*Silicon dioxide, Refractory materials), (*Nozzle inserts, Refractory materials), Material forming, Hot pressing, Grinding, Density, Sintering, Microstructure, Particle size, Ablation, Rocket motor nozzles.
Identifiers: Ablative materials.

Processes were developed for hot pressing a 68.5% tungsten-31.5% silica composition to over 97% of the calculated theoretical density. Hot pressing characteristics changed when crystalline silica was substituted for vitreous silica. Grinding and hot pressing methods were studied for fabricating test nozzles for the NOL oxyhydrogen rocket motor. Gases entrapped during hot pressing are expected to be a factor in ablation performance. Vacuum-argon sintering of the silica-tungsten mixture was studied and photomicrographs revealed a structure similar to that of the Bjorksten Laboratory specimens but different from that of hot pressed material. (Author)
AD-646 616 HC$3.00 MF$0.65

MEASUREMENT OF NEUTRON SPECTRUM, AGE, AND DIFFUSION LENGTH IN CONCRETE,
Virginia Univ., Charlottesville. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 20H.
AD-646 630 HC$3.00 MF$0.65

STRUCTURAL GUIDELINES FOR MATERIALS DEVELOPMENT. PART III. GUIDELINES FOR TENSION AND COMPRESSION STRUCTURES.
Allied Research Associates, Inc., Concord, Mass.
For primary bibliographic entry see Field 13M.
AD-646 809 HC$3.00 MF$0.65

2929MC - STRENGTH OF STRUCTURAL CERAMICS UNDER IMPACT LOADING.
Final rept., 15 Aug 63-31 Oct 64,
Ohio State Univ., Research Foundation, Columbus.
J. O. Everhart, and Lawrence E. Muttart. Dec 66, 43p 1681-2
Grant DA-ARO (D)-31-124-G480

Descriptors: (*Ceramic materials, Impact tests), (*Loading (Mechanics), Ceramic materials), Structural properties, Failure (Mechanics), Rupture, Fracture (Mechanics), Stresses, Surfaces, Resonance.

Development of additional information on wedging stresses is given, showing the functions of stress due to wedging as a function of time, and distance from the point of impact. Development of the resonant reactions of specimens subjected to impact is also given. The shear wave, on reflection from the ends of the specimen seems to control the beginning of resonant reactions. In the present report, static stress values are calculated for a point on the linear portion of the loading curve. This value then is corrected for time to failure, and for inertial corrections at the time of failure. Only single impact loading before failure can be treated with confidence.
AD-646 879 HC$3.00 MF$0.65

THE MECHANICAL BEHAVIOR OF STRONTIUM ZIRCONATE.
Final rept., 15 Oct 65-14 Oct 66,
State Univ. of New York, Alfred. Coll. of Ceramics.
J. E. Funk, J. Nemeth, and J. R. Tinklepaugh. 14 Oct 66, 60p
Contract NOw-66-0191

Descriptors: (*Ceramic materials, Perovskites), (*Perovskites, Notch sensitivity), Strontium compounds, Zirconium compounds, Oxides, Mechanical properties, Single crystals, Twinning (Crystallography), Porosity, Iron, Sintering, Crystallography.

Yielding perovskites such as SrZrO3, CaZrO3 and BaTiO3 exhibit less notch sensitivity than was expected. A considerable amount of yield, without increase in stress, was observed in notched strontium zirconate samples having some porosity. It is speculated that free surface, increased by the flaws introduced by the notch and by the presence of some porosity, permitted uninhibited domain motion in grains exposed to that surface. It was observed that domain motion in perovskites under mechanical stress may be influenced by more than crystallographic shear angle. The defect structure in terms of the 'A' cation and oxygen vacancies may affect both domain crystallography and the ease of domain motion. Iron was found to be a most useful addition to promote sintering in strontium zirconate.
AD-646 925 HC$3.00 MF$0.65

MULTIDISCIPLINARY RESEARCH ACTIVITY IN THE MATERIALS SCIENCES WITH EMPHASIS ON CERAMIC MATERIALS SEMIANNUAL STATUS REPORT, JUN. 16 - DEC. 15, 1966.
Washington Univ., Seattle. Ceramic Engineering Div.
J. I. Mueller. 15 Dec 66, 37p NASA-CR-81163, SASR-7
Grant NSG-484

Descriptors: *Ceramics, *Radiation effect, *Solid state, *Surface property, Aluminum, Antenna, Calorimetry, Carbon, Chemistry, Deformation, Effect, Equilibrium, Ferroelectrics, Mossbauer effect, Oxygen, Phase, Processing, Property, Radiation, Solid, State, Surface, System, Thermodynamics, Topography, Zirconium.

For abstract, see STAR 05 06.
N67-15390 HC$3.00 MF$0.65

GLASS TRANSITION PHENOMENA SEMIANNUAL STATUS REPORT.
University of Southern Calif., Los Angeles.
R. A. Haldon, P. Rawlings, W. J. Schell, and R. Simha. 1 Dec 66, 6p NASA-CR-81240
Grant NSG-343

Descriptors: *Heat capacity, *Poiymer physics, *State equation, Alkyl, Butyl, Calorimetry, Capacity, Crystalline, Equation, Ethyl, Glass, Heat, Methacrylate, Methyl, Physics, Polymer, State, Temperature, Transition.

For abstract, see STAR 05 06.
N67-15881 HC$3.00 MF$0.65

MASS-TRANSFER EFFECTS IN SOME REFRACTORY-METAL-ALKALI-METAL-STAINLESS STEEL SYSTEMS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 04.
ORNL-4028 HC$3.00 MF$0.65

PRESTRESSED CONCRETE DURABILITY AND CORROSION,
Montana State Univ., Bozeman. Engineering Research Labs.
Martin E. Moss. 1966, 228p Rept. no. 0579
Prepared in cooperation with Montana State Highway Commission, and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Reinforced concrete, Performance (Engineering)), (*Reinforcing materials, Corrosion), Stresses, Structural properties, Degradation, Aging (Materials), Freezing, Melting, Permeability.

Small prestressed slabs with stress levels of zero, 500, and 1200 p.s.i. were tested for freeze-thaw durability, scaling, and for ingressing salt ion corrosion of encased prestressing strands. Both normally cured and steam-cured slabs were subjected to tap water, calcium chloride solution, and sulfate solution. Durability was found to be moderately stress dependent, steam curing reduced durability, and magnesium sulfate solution had no effect on durability while calcium chloride solution reduced it slightly. Scaling was not affected by prestress load nor aggravated by magnesium sulfate solution as compared with water. Freezing and thawing calcium chloride solution ponded on the slab caused severe scaling, more than when water was frozen and then thawed with the salt. Early scaling was reduced by steam curing, but later scaling increased. There was no evidence of corrosion of the encased strands, although the fluids had been in contact with them. Clean strands exposed to the three solutions by towel wick were corroded. Calcium chloride was the most corrosive, followed by magnesium sulfate and then water. (Author)
PB-174 007 HC$3.00 MF$0.65

INFLUENCE OF LOAD HISTORY ON CRACKING IN REINFORCED CONCRETE,
California Univ., Berkeley. Div. of Structural Engineering and Structural Mechanics.
Boris Bresler, and Vitelmo Bertero. Aug 66, 47p Rept. no. 0644
Prepared in cooperation with Bureau of Publich Roads, Washington, D. C.

Descriptors: (*Reinforced concrete, Cracks), Reinforcing materials, Steel, Cylindrical bodies, Loading (Mechanics), Strain (Mechanics), Stresses, Fracture (Mechanics), Degradation, Bonding, Structural properties.

An experimental investigation of strains, stresses, and crack widths in an axially reinforced concrete prism subjected to repeated tension loads is presented. Four cylindrical specimens, 6 inches in diameter and 16 inches long, were reinforced with No. 9 deformed steel bars, specially instrumented with electrical strain gages to define the strain distribution along the length of the bar. The steel bar was sectioned longitudinally, grooved for installation of 30 strain gages along the length, and after wiring the gages, the sections were rewelded to form an instrumented bar with effectively undisturbed exterior. After casting and curing the specimens, a circumferential notch was cut in the midlength of the concrete cylinder to induce formation of a crack at the notched section during loading. The specimens were subjected to repeated loads at different stress levels, with the total number of load cycles varying from 14 to 65. Concrete strengths of 3 and 6 ksi, and steel reinforcement with yield strengths of 47 ksi and 100 ksi were

used. Crack widths at mid-length, end slips, and strains in the steel bar and concrete cylinder were recorded. Residual effects after unloading and changes in strain distribution resulting from prior loading history are discussed. It was found that under a variable stress history, the effectiveness of bond between concrete and steel depends primarily on the magnitude of the previous maximum load. The greater the magnitude of the previous maximum load, the lesser is the effectiveness of bond at subsequent lower stress levels. (Author)
PB-174 011 HC$3.00 MF$0.65

FRICTION LOSS IN POST TENSIONED PRESTRESSING STEEL UNITS,
California State Div. of Highways.
For primary bibliographic entry see Field 13M.
PB-174 012 HC$3.00 MF$0.65

11C. COATINGS, COLORANTS, AND FINISHES

DETERMINATION OF CARBON BLACK IN HIGH GLOSS ENAMELS AND LACQUERS.
Final rept.,
Army Coating and Chemical Lab., Aberdeen Proving Ground, Md.
Melvin H. Swann. Nov 66, 12p CCL-215

Descriptors: (*Carbon black, Quantitative analysis), (*Pigments, Carbon), Particle size, Ceramic coatings, Varnishes, Finishes + finishing, Organic coatings, Solvents.

There is no analytical method for measuring the amount of carbon pigment in high-gloss black enamels and lacquers, and no accurate procedure for determining the total pigment content of any coating that contains carbon. The colloidal suspension of extremely small particles of carbon prohibit separation and measurement by filtration or by contrifugation. This report describes a new, simple, rapid quantitative method for measuring total pigment in any solvent-type organic coating including those containing carbon pigments. It is based on agglomeration of suspended particles in a nonaqueous medium, followed by filtration and washing in a special crucible.
AD-646 381 HC$3.00 MF$0.65

DETECTION OF ROSIN, ROSIN DERIVATIVES, AND PHENOLIC RESIN MODIFICATIONS IN ALKYD COATINGS USING ULTRAVIOLET SPECTROPHOTOMETRY.
Final rept.,
Army Coating and Chemical Lab., Aberdeen Proving Ground, Md.
Marilyn R. Allis. Nov 66, 21p CCL-220

Descriptors: (*Ultraviolet spectroscopy, *Plastic coatings), Polyester plastics, Phenolic plastics.
Identifiers: Rosin.

Ultraviolet spectrophotometry is used to show the presence of rosin or ester gum modifications in the unsaponifiable portion of an isolated alkyd coating vehicle. Phenolic resins are similarly detected in either the unsaponifiable portion or in the oil acids fraction if they are saponified. Phenolic resins are readily detectable; however, the method is limited to 5%, on the non-volatile basis, of rosin or ester gum. (Author)
AD-646 383 HC$3.00 MF$0.65

NEW DEVELOPMENTS IN CLAD METAL WIRE
Texas Instruments, Inc., Attleboro, Mass. Materials Div.
For primary bibliographic entry see Field 9A.
AD-646 525 HC$3.00 MF$0.65

PROTECTION OF GEOPHYSICAL, COMMUNICATION AND POWER TRANSMISSION CABLE AGAINST RODENT SPECIES ATTACK BY R-55 RODENT REPELLENT TREATMENT,
Phillips Petroleum Co., Bartlesville, Okla. Commercial Development Div.
For primary bibliographic entry see Field 9A.
AD-646 536 HC$3.00 MF$0.65

THE EVOLUTION OF SHEATH CONSTRUCTIONS FOR COMMUNICATIONS CABLES,
Dow Chemical Co., Midland, Mich. Plastics Dept.
For primary bibliographic entry see Field 9A.
AD-646 537 HC$3.00 MF$0.65

APPLICATION OF WELDED THIN METAL IN NEW COMMUNICATION CABLE DESIGNS,
Canada Wire and Cable Co. Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 9A.
AD-646 538 HC$3.00 MF$0.65

DESIGN AND MANUFACTURE OF PLASTIC INSULATED ALUMINUM CONDUCTOR TELEPHONE CABLE,
Bell Telephone Labs., Baltimore, Md.
For primary bibliographic entry see Field 17B.
AD-646 541 HC$3.00 MF$0.65

NEW COATING PROCESS FOR FOAMED POLYETHYLENE INSULATED TELEPHONE CABLE,
Sumitomo Electric Industries Ltd., Yokohama (Japan).
For primary bibliographic entry see Field 17B.
AD-646 542 HC$3.00 MF$0.65

PROTECTION OF TELEPHONE CABLES FROM ATTACK BY INSECTS,
Postmaster-General's Dept., Melbourne (Australia). Physics and Polymer Group.
For primary bibliographic entry see Field 17B.
AD-646 543 HC$3.00 MF$0.65

THREE TYPES OF CABLE SHEATH PRODUCED BY HIGH FREQUENCY WELDING,
AMF Thermatool, Inc., New Rochelle, N. Y.
For primary bibliographic entry see Field 9A.
AD-646 544 HC$3.00 MF$0.65

DEVELOPMENT OF COMPOSITE STRUCTURAL MATERIALS FOR HIGH TEMPERATURE APPLICATIONS.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
For primary bibliographic entry see Field 11D.
AD-646 919 HC$3.00 MF$0.65

EVALUATION OF OXIDATION-RESISTANT COATINGS FOR INERT-ATMOSPHERE APPLICATIONS.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
For primary bibliographic entry see Field 11F.
For abstract, see STAR 05 06.
N67-15683 HC$3.00 MF$0.65

SILICONE COATED TRAYS FOR PARAFFIN EMBEDDING,
California Univ., Berkeley. Dept. of Botany.
For primary bibliographic entry see Field 6L.
PB-174 075 HC$3.00 MF$0.65

11D. COMPOSITE MATERIALS

DEVELOPMENT OF COMPOSITE STRUCTURAL MATERIALS FOR HIGH TEMPERATURE APPLICATIONS.
Final rept., 22 Nov 65-22 Nov 66,
General Electric Co., Philqdelphia, Pa. Missile and Space Div.
Juan Chorne, Charles H. Bruch, and Willard H. Sutton. Jan 67, 121p
Contract NOw-66-0443

Descriptors: (*Composite materials, High-temperature research), (*Whiskers (Crystals), Aluminum compounds), Nickel, Nickel alloys, Electroforming, Bonding, Refining (Metallurgy), Microstructure.

The report gives the development of new structural composite materials having high strength-to-weight ratios at elevated temperatures. The current effort was directed towards the use of nickel and nickel alloys as the matrix to be reinforced by high strength Al2O3 single crystal whiskers. The major emphasis during this contract (22 Nov. 1965 - 22 Nov. 1966) was placed on evaluating factors important to two potential processes for making high strength composites; namely, liquid metal infiltration and high temperature pressure-bonding of electro-formed whisker bundles. In support of these studies, some effort was devoted to whisker growth, whisker evaluation, and to whisker handling studies. (Author)
AD-646 919 HC$3.00 MF$0.65

PERFORMANCE OF THREE ABLATION MATERIALS DURING SIMULATION OF LONG-DURATION AFTERBODY HEATING.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
M. B. Dow, and S. S. Tompkins. Jan 67, 35p
NASA-TM-X-1330
Contract 124-08-03-18-23

Descriptors: *Ablating material, *Afterbody, *Elastic deformation, *Heat resistance, *Lifting body, Ablation, Body, Buckling, Char, Composite, Convection, Deformation, Elastic, Elastomer, Epoxy, Expansion, Exposure, Heat, Honeycomb, Lifting, Material, Penetration, Reentry, Reinforcement, Resistance, Silicone, Simulation.

For abstract, see STAR 05 06.
N67-16677 HC$3.00 MF$0.65

11E. FIBERS AND TEXTILES

BEHAVIOR OF NOTCHED FIBERS IN LONGITUDINAL TENSION.
Technical rept.,
Textile Research Inst., Princeton, N. J.
Dusan C. Prevorsek, Arthur B. Coe, and W. James Lyons. May 65, 21p TR-6
Contracts Nonr-4184 (00), Nonr-4184 (01)

Descriptors: (*Fibers (Synthetic), Mechanical properties), (*Test equipment, Fibers (Synthetic)), (*Nylon, Mechanical properties), Deformation, Molecular structure, Fracture (Mechanics), Material removal, Stresses, Tensile properties.
Identifiers: Defects (Materials).

Devices for cutting notches of controlled depth in monofils, and for manipulating notched specimens under the microscope are described. Notches have been cut in nylon monofils, and the deformation of specimens in the neighborhood of the cracks, when tension (to rupture) is applied, has been examined microscopically. The behavior of the fiber material at the roots of notches is discussed, and interpreted in terms of molecular structure and orientation. It is concluded that two mechanisms are operative in the propagation of a notch or crack to rupture. Tensile tests made on monofils of various diameters, as well as on notched specimens, reveal that breaking strength decreases as the diameter becomes larger. From a plot of the breaking loads of monofils having chordal notches of varying depth an estimate of

the equivalent depth of the inherent flaw is obtained. (Author)
AD-464 235 HC$3.00

HETEROCHAIN HIGH-MOLECULAR COMPOUNDS. COLLECTION OF ARTICLES: SELECTED ARTICLES,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 11I.
AD-646 447 HC$3.00 MF$0.65

11F. METALLURGY AND METALLOGRAPHY

RAMJET TECHNOLOGY. MATERIALS FOR RAMJET ENGINES AND COMPONENTS,
TRW Space Technology Labs., Los Angeles, Calif.
For primary bibliographic entry see Field 21E.
AD-254 759 HC$3.00

MOLYBDENUM SHEET ROLLING PROGRAM.
Final rept.,
Universal-Cyclops Steel Corp., Bridgeville, Pa.
L. M. Bianchi, W. A. McNeish, and R. G. McLaughlin. 22 Oct 64, 306p
NOas-59-6142

Descriptors: (*Material forming, Molybdenum alloys), (*Molybdenum alloys, Sheets), Melting, Extrusion, Forging, Rolling (Metallurgy), Cold working, Controlled atmospheres, Mechanical properties, Grain structures (Metallurgy), Plasticity, Annealing, Hardness, Surface properties.
Identifiers: Molybdenum alloy TZM, Molybdenum alloy 0.5TI, Infab.

All phases of the production of arc cast molybdenum alloy sheet (MO+0.50TI and TZM and TZM) were studied from melting stock to final product. The study included variables in ingot size, primary fabrication by extrusion and direct forging in infab, secondary working over the range of warm to true hot working. Rolling studies included percent cold work, rolling temperature, intermediate annealing treatments and surface contamination. In the final phase of the program, approximately 3000 pounds of sheet were produced, tested and distributed to other contractors for thorough evaluation. (Author)
AD-458 529 HC$3.00

FABRICATION AND PROPERTIES OF TUNGSTEN SINGLE CRYSTALS. PART I. GROWTH OF SINGLE CRYSTAL TUNGSTEN TO BE USED FOR ROLLING INTO SINGLE CRYSTAL SHEET. PART II. ROLLED SINGLE CRYSTAL TUNGSTEN SHEET.
Linde Div., Union Carbide Corp., Indianapolis, Ind.
For primary bibliographic entry see Field 20B.
AD-464 350 HC$3.00

PROTECTION OF TITANIUM ALLOYS AGAINST HIGH TEMPERATURE GASEOUS CORROSION,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
Yu. A. Pankov, and O. P. Golub. 14 Jul 66, 15p
FTD-TT-65-1956
TT-67-60780
Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Chernaya Metallurgiya (USSR), v8 n2 p118-24 1965.

Descriptors: (*Titanium alloys, *Corrosion), (*Heat-resistant metals + alloys, Titanium alloys), Microstructure, Hardness, Sintering, Absorption, Rolling (Metallurgy), Forging, Density.

The report gives the results of an investigation on the protection of the heated metal more inactive than a sinter layer, and stable in aggressive media of a vitreous impermeable gas film of the fusion. (Author)
AD-646 424 HC$3.00 MF$0.65

SOME REGULARITIES IN THE DESTRUCTION OF METAL SURFACES THAT ARE SUBJECTED TO THE ACTION OF CAVITATION IN MOLTEN LEAD,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
I. N. Bogachev, V. S. Litinov, R. I. Mints, and N. V. Nesterova. 29 Aug 66, 13p FTD-HT-66-317
TT-67-60786
Unedited rough draft trans. of Fizika Metallov i Metallovedenie (USSR), v18 n5 p752-7 1964.

Descriptors: (*Metals, Degradation), Cavitation, Iron alloys, Nickel, Copper, Lead, Steel, Liquid metals, Surface properties, Hardening, Creep, Tensile properties, Microstructure, Shock resistance, Thermal expansion, Erosion, USSR.

The report is a study of the destruction of nickel, copper, austenite alloys of iron with nickel and manganese, and 1Kh18N9T and 1Kh13 steels that were subjected to the action of cavitation in molten lead. The same regularities are characteristic for cavitation erosion in liquid metal and water. Destruction with basically a mechanical character is localized in separate surface micro-volumes of the metal. Observation shows a dependence between the hardening of a metal under the action of cavitation in the melt and its resistance. High anticorrosion properties of metals are not a sufficient condition of their resistance during dynamic interaction with a melt. (Author)
AD-646 448 HC$3.00 MF$0.65

ELECTRON MICROSCOPE OBSERVATIONS OF QUENCHED AND AGED GOLD AND GOLD-PALLADIUM ALLOYS,
Pennsylvania Univ., Philadelphia. School of Metallurgical Engineering.
Roger H. Cook, and Robert Maddin. 30 Jan 67, 94p
Contract Nonr-551 (55)

Descriptors: (*Gold alloys, Crystal lattice defects), (*Crystal lattice defects, Palladium alloys), Quenching (Cooling), Aging (Materials), Electron microscopy, Crystallography, Melting point, Crystal structure, Foils, Crystal lattices.

A review of past work on the behavior of vacancies in quenched metals is presented, with emphasis upon gold and transmission electron microscopy data. Results are presented on Au, Au-5 at% Pd, and Au-10 at% Pd foils quenched from 0.875 Tm (Tm = absolute melting temperature) and examined in an electron microscope. It is found that increasing palladium content causes an increase in the number of faulted dislocation loops in the quenched and aged material and in the concentration of vacancies annihilated at such loops. However stacking fault tetrahedra represent the most important sinks in all cases. Some reasons for the increased importance of dislocation loops as vacancy sinks in the alloys are discussed. Changes in stacking fault energy due to alloying are not thought significant in producing this effect. Possible roles of nucleus configurations are discussed and a model is presented in which tetrahedra become less effective as sinks as their growth proceeds, owing to changes in solute concentration near them. However the effectiveness of loops as sinks is not expected to change significantly during ageing with the result that dislocation loops can become the main sinks in the later stages of ageing.
AD-646 455 HC$3.00 MF$0.65

NiFeCu FILMS,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
M. S. Cohen. 1966, 1p
Research supported in part by USAF.
Availability: Published in IEEE Transactions on Magnetics v MAG-2 n3 p581-2 Sep 1966.

Descriptors: (*Metal films, Anisotropy), Nickel alloys, Iron alloys, Copper alloys, Magnetic properties, Deposition.

Alloy films produced by simultaneous deposition from two separate sources, one evaporating NiFe and the other evaporating Cu, can exhibit large oblique-incidence ferromagnetic anisotropy even for small incidence angles. For vapor beam angles of NiFe, high compared with those of Cu, the simultaneous deposition causes a large increase in the value of the magnetic anisotropy over that produced by oblique incidence of the NiFe alone; for vapor beam angles of Cu, high compared with those of NiFe, the oblique incidence of the Cu controls the production of the anisotropy. The values of the magnetization dispersion and the wall coercive force Hw increase with the Cu concentration. For high Cu concentrations magnetic viscosity phenomena appear, while for sufficient Cu concentrations the magnetic anisotropy of the film is destroyed. These effects were also exhibited by films of NiFe with Ag, Al, Au, Pb, Sn, and Zn, but NiFeCu films were most extensively studied. Various measurements showed that the presence of Cu did not promote the growth of the crystallite chains which cause the oblique-incidence anisotropy in pure NiFe films. Instead, it is suggested that Cu is distributed at the crystallite interfaces in a layer which is so thin that it is not directly detectable, but which is thick enough to weaken or destroy the inter-crystalline exchange bonds. (Author)
AD-646 481 Not available from CFSTI.

CORROSION RESEARCH STUDIES ON FORGED BERYLLIUM.
Final rept. 1 Dec 64-30 Jun 66,
Douglas Aircraft Co., Inc., Newport Beach, Calif. Astropower Lab.
C. B. Gilpin, and T. L. Mackay. Jan 67, 73p SM-46226-F
AFML-TR-66-294
Contract AF 33 (615)-2242

Descriptors: (*Beryllium, Forging), (*Corrosion, Beryllium), Protective treatments, Corrosion inhibition, Stress corrosion, Humidity, Salt spray tests, Sodium compounds, Chlorides, Jet engines, Anodic coatings, Environment, Oxides, Films, Fatigue (Mechanics), Oxidation.

Bare beryllium when exposed to high humidity environments at 100 F is not attacked; however, in the presence of aqueous sodium chloride at the same temperature bare beryllium is severely pitted. A protective coating will be necessary for beryllium when exposed to this environment. In the presence of aqueous salt environments and elevated temperature, bare beryllium shows its maximum corrosion resistance at 600 F, due to a protective oxide film formed at this temperature. Below this temperature beryllium is attacked by aqueous salt environments and above this temperature catastrophic oxidation of beryllium occurs. Vapor deposited aluminum offered little corrosion protection for beryllium in the presence of aqueous salt environments and the ultimate tensile strength was degraded by this coating at 400 F and 600 F. Anodized and SermeTel W coatings offered good corrosion protection for beryllium in the presence of aqueous salt environments and elevated temperatures of 600 F.
AD-646 508 HC$3.00 MF$0.65

AN INVESTIGATION OF THE EFFECTS OF SOLUTE ELEMENTS ON THE MAGNETOELASTIC DAMPING AND COERCIVITY IN VERY PURE IRON.
Final rept.,
Battelle Memorial Inst., Columbus, Ohio.

R. E. Maringer. 1 Feb 67, 24p
Contract Nonr-2606 (00)

Descriptors: (*Iron, Magnetic properties), Crystal lattice defects, Ferromagnetism, Defects (Materials), Elasticity, Impurities, Damping, Permeability (Magnetic).

The existence of ferromagnetic domains and domain walls in alpha iron provides the basis for a wide variety of related magnetic and magnetoelastic properties which reflect the behavior of defects in the iron lattice. The special case of solute interstitial atoms serves as a general example. The interstitial atoms tend to order with respect to the magnetic vector within a domain, and thereby tend to inhibit domain-wall motion. Since the domain walls can be induced to move by imposing either a magnetic field or a stress, there is a considerable parallelism between the results of both experimental techniques. For example, magnetic permeability has its counterpart in the strain-amplitude dependence of magnetoelastic damping; the time-dependent decrease in magnetic permeability after demagnetization has its counterpart in the time-dependent decrease in magnetoelastic damping after demagnetization; the temperature dependence of magnetic permeability has its counterpart in the magneteoelastic contribution to the dynamic modulus. The role played by magnetic- and stress-induced ordering in these phenomena is now reasonably well understood. (Author)
AD-646 513 HC$3.00 MF$0.65

METALLURGICAL CHARACTERISTICS OF HIGH STRENGTH STRUCTURAL MATERIALS.
Quarterly progress rept. no. 11, Apr-Jun 66,
Naval Research Lab., Washington, D. C.
P. P. Puzak, K. B. Lloyd, R. W. Huber, R. J. Goode, and E. A. Lange. Aug 66, 86p NRL-6513
See also AD-641 262.

Descriptors: (*Metal plates, Structural properties), Titanium alloys, Aluminum alloys, Maraging steels, Heat treatment, Fatigue (Mechanics), Welding, Toughness, Fracture (Mechanics), Tensile properties.

A progress report covering the research studies in high strength structural metals conducted during the period April through June 1966 is presented. The report includes fracture toughness studies on specially melted 18% Ni grade 250 ksi maraging steel and a Cr-Ni-Mo stainless steel. Welding studies on a 12Ni-5Cr-3Mo maraging steel with 12Ni-3Cr-3Mo filler metal wire are described with the problems associated with developing optimum properties in both plate and weldment being discussed. Results of fracture toughness studies on titanium alloys and aluminum alloys are presented in which engineering type tests and fracture mechanics techniques are employed. The fracture toughness index diagrams for steels and titanium are presented based upon the correlations developed with the engineering test methods. Preliminary fracture toughness correlation diagrams are presented for titanium alloys based upon fracture mechanics test methods. Results of a study on the low cycle fatigue crack propagation of a 9Ni-4Co-0.25C steel in air and salt water is discussed and compared to similar data obtained for other steels covering a spectrum of yield strengths. Stress-corrosion-cracking studies were conducted on titanium alloys, aluminum alloys, and steels.
AD-646 520 HC$3.00 MF$0.65

METHODS AND CAPABILITIES OF ELECTRON MICROSCOPE FRACTOGRAPHY.
Technical rept.,
Springfield Armory, Mass.
John F. West. 30 Jun 66, 39p SA-TR20-2411

Descriptors: (*Fractography, Electron microscopy), Microstructure, Fracture (Mechanics), Mechanical properties.

Methods and capabilities of electron microscope fractography were investigated so that the potential use of fractography could be determined. Work of other investigators was studied, equipment was set up, and the application of two- and three-stage replication techniques was evaluated. Electron microscope fractographs made by the first method are shown. Modes of fracture are discussed and diagnostic features of each mode, visible with the electron microscope, are described with references to pertinent literature. Characteristic features of fracture surfaces are illustrated by electron microscope fractographs. (Author)
AD-646 579 HC$3.00 MF$0.65

INVESTIGATION OF RESONANT BEAM AND ULTRASONIC METHODS FOR THE EVALUATION OF SINTERED POWDER STEEL COMPACTS.
Technical rept.,
Springfield Armory, Mass.
R. H. Brockelman. 20 May 66, 32p SA-TR19-1521

Descriptors: (*Powder metallurgy, Non-destructive testing), (*Non-destructive testing, *Ultrasonic radiation), Steel, Resonance, Steel, Sintering, Mechanical properties, Effectiveness.

Results of an investigation designed to determine the practicability of evaluating the mechanical properties of sintered steel powder compacts by ultrasonic and mechanical resonance technique are described. The yield and tensile strengths of sintered prealloyed steel are correlated with sintered density, resonant frequency, sonic and ultrasonic velocity, as well as C-scan ultrasonic transmission recordings. The correlations that have been established demonstrate the effectiveness of sonic and ultrasonic methods for the nondestructive evaluation of sintered powder metals. The experimental procedures are described and the capabilities and limitations of each technique are discussed. (Author)
AD-646 580 HC$3.00 MF$0.65

RECOVERY PROCESSES AND ORDERING IN Ni3Al.
Wayne State Univ., Detroit, Mich.
For primary bibliographic entry see Field 20B.
AD-646 602 HC$3.00 MF$0.65

ON THE USE OF THE RING TEST FOR DETERMINING RATE SENSITIVE MATERIAL CONSTANTS.
Catholic Univ. of America, Washington, D. C.
For primary bibliographic entry see Field 20K.
AD-646 609 HC$3.00 MF$0.65

DEVELOPMENT OF EQUIPMENT AND TECHNIQUES FOR COMPLEX FATIGUE LOADING.
Aerojets, Inc., West Chester, Pa.
For primary bibliographic entry see Field 20K.
AD-646 647 HC$3.00 MF$0.65

A BEND METHOD FOR MEASURING FATIGUE CRACK PROPAGATION IN THICK MATERIALS.
Royal Aircraft Establishment, Farnborough (England).
For primary bibliographic entry see Field 20K.
AD-646 649 HC$3.00 MF$0.65

IRRADIATION EFFECTS ON REACTOR STRUCTURAL MATERIALS.
Naval Research Lab., Washington, D. C.
For primary bibliographic entry see Field 18J.
AD-646 662 HC$3.00 MF$0.65

TWINNING AND THE LOW TEMPERATURE MECHANICAL PROPERTIES OF POLYCRYSTALLINE COLUMBIUM, MOLYBDENUM AND CbMo ALLOYS.
Westinghouse Electric Corp., Pittsburgh, Pa. Research and Development Center.
For primary bibliographic entry see Field 20B.
AD-646 682 HC$3.00 MF$0.65

AVIATION TECHNOLOGICAL INSTITUTE, MOSCOW. TRANSACTIONS, VOL. 50, 1961.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
13 Jan 67, 166p FTD-MT-64-90
TT-67-60880
Edited machine trans. of Aviatsionnyi Tekhnologicheskii Institut, Moscow. Trudy (USSR) v50 p1-186 1961.

Descriptors: (*Metallography, Reports), Physical properties, Case hardening, Brittleness, Metallic crystals, Age hardening, Austenite, Titanium alloys, Thermal stability, Deformation, USSR.

Content: Influence of Tungsten, Niobium, and Zirconium on the Stability of Austenite and Hardenability of Machine-Building Chrome-Nickel Steel; Carburization of Stainless Steels; Character of Intercrystalline Brittleness of Technical Iron in Cold State; Inclination of Low-Carbon Transformer Steel to Magnetic Aging and Method of Appraising This Inclination; Isothermal Treatment of 13Kh12NVFMA Steel; Influence of Hydrogen on Structure and Properties of VT8 and VT10 Alloys; Influence of Magnitude of Grain on Hydrogen Embrittlement of Titanium and Its Alloys; Influence of Hydrogen on Thermal Stability of Alloy VT3-1; Influence of Oxygen and Hydrogen on Structure and Properties of Titanium; Hydrogen Embrittlement of Titanium Alloys with Aluminum; Distribution of Alloying Components in a Titanium Ingot, Obtained by the Method of Melting with a Consumable Batch Electrode; Calculations of Crystallization of Binary Alloys; Prospects of Application of Silumin as Deformable Alloys; Investigation of the Effect of the Composition on Mechanical Properties of Avial, Hardened with a Lowered Cooling Rate; Effect of the Type of Addition Material During Manual Argon Arc Welding on the Properties of Joints from Alloy M40; Effect of Conditions of Automatic Argon Arc Welding on Properties of Joints from Alloy M40; Distinctive Features of Aging of Aluminum Alloys Containing 5% Zn and 1-2% Mg; and High-Speed Conditions of Aging of Aluminum Alloys Containing 5% Zn and 1-2% Mg. (Author)
AD-646 733 HC$3.00 MF$0.65

STRUCTURAL GUIDELINES FOR MATERIALS DEVELOPMENT. PART III. GUIDELINES FOR TENSION AND COMPRESSION STRUCTURES.
Allied Research Associates, Inc., Concord, Mass.
For primary bibliographic entry see Field 13M.
AD-646 809 HC$3.00 MF$0.65

EFFECT OF SULFUR IN JP-5 FUEL ON HOT CORROSION OF COATED SUPERALLOYS IN MARINE ENVIRONMENT.
Progress rept. no. 2, 1 Jul-30 Sep 66,
Phillips Petroleum Co., Bartlesville, Okla. Research Div.
H. T. Quigg, and R. M. Schirmer. Dec 66, 96p
Rept. no. 4616-66R
Contract NOw-66-0263

Descriptors: (*Nickel alloys, Corrosion), (*Gas turbine blades, Corrosion), (*Sulfur, Jet engine fuels), Aluminum coatings, Oxidation, Sulfation, Environmental tests, Chromium.
Identifiers: Inconel (Alloys).

An experimental investigation is in progress to determine whether the 0.4 per cent by weight of sulfur allowed in JP-5 fuel is a safe level for the protection of coated superalloys, used in aircraft-turbine engines of advanced design, when operated in a marine environment. The Phillips 2-inch combus-

tor test facility was used to simulate the environment in the turbine section of an aircraft engine with respect to temperature, velocity, pressure, and stoichiometry. Tests were conducted with a nickel-base alloy (Inconel 713C) having either an aluminum-diffusion coating (Misco MDC-1) or an aluminum-chromium-diffusion coating (Misco MDC-9) at all combinations of three levels of sulfur in fuel (0.0002, 0.040, and 0.40 weight per cent) with two levels of 'sea salt' in air (zero and 1.0 ppm). Exponential equations of weight-loss with time have been developed from a preliminary analysis of incomplete data, and statistically-significant effects have been identified at a 95 per cent confidence level. In all comparisons the removal of 'sea salt' from the air significantly decreased the rate of attack; thus, indicating sea salt to be a primary-causative agent of hot corrosion. The effect of sulfur in fuel varied with the superalloy coating and the presence or absence of 'sea salt'. In no case did a reduction of sulfur in fuel from the present limit to 0.040 weight per cent have a significant effect on the rate of attack; however, in the presence of 1.0 ppm 'sea salt' in air, a reduction to 0.0002 weight per cent sulfur in fuel significantly decreased the rate of attack on both coated superalloys. (Author)
AD-646 810 HC$3.00 MF$0.65

DEVELOPMENT OF COMPOSITE STRUCTURAL MATERIALS FOR HIGH TEMPERATURE APPLICATIONS.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
For primary bibliographic entry see Field 11D.
AD-646 919 HC$3.00 MF$0.65

FEASIBILITY STUDY FOR FABRICATION OF CU-B4C SHEET,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 04.
LA-3570-MS HC$3.00 MF$0.65

AN EQUATION OF STATE FOR IRON ASSUMING AN INSTANTANEOUS PHASE CHANGE,
Los Alamos Scientific Lab., N. Mex.
Charles L. Mader. Sep 66, 20p
Contract W-7405-eng-36

Descriptors: (*Equations of state, Iron), (*Iron, Phase studies), Shock waves.

For abstract, see NSA 21 04.
LA-3599 HC$3.00 MF$0.65

THE MECHANICAL PROPERTIES OF DILUTE URANIUM ALLOYS AT ELEVATED TEMPERATURES.
Topical rept.,
Mallinckrodt Chemical Works, Weldon Springs, Mo. Uranium Div.
M. F. Nolan. 1 Aug 66, 70p
Contract W-14-108-eng-8
For abstract see NSA 21 06.

Descriptors: (*Uranium alloys, Mechanical properties), (*High-temperature research, Uranium alloys), Heat of activation, Fracture (Mechanics), Hardness, Hardening, Tensile properties.
MCW-1505 HC$3.00 MF$0.65

EVALUATION OF OXIDATION-RESISTANT COATINGS FOR INERT-ATMOSPHERE APPLICATIONS.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
W. M. Phillips. 15 Jan 67, 24p NASA-CR-81191, JPL-TR-32-1014
Contract NAS7-100

Descriptors: *Inert atmosphere, *Oxidation resistance, *Protective coating, Aluminum, Argon, Atmosphere, Coating, Inert, Oxidation, Oxygen, Protection, Resistance, Silicide, Strength, Test, Tin, Vapor, Water.

For abstract, see STAR 05 06.
N67-15683 HC$3.00 MF$0.65

INVESTIGATION OF MECHANICAL PROPERTIES OF CHROMIUM, CHROMIUM-RHENIUM, AND DERIVED ALLOYS FINAL REPORT, APR. 1 - AUG. 31, 1966.
Battelle Memorial Inst., Columbus, Ohio.
J. W. Edington, A. Gilbert, and M. J. Klein. 31 Aug 66, 84p NASA-CR-81225
Contract NASW-101

Descriptors: *Chromium alloy, *Mechanical property, *Rhenium alloy, Activation, Alloy, Analysis, Bending, Brittleness, Chromium, Crystal, Defect, Ductility, Effect, Hardness, Mechanical, Molybdenum, Phase, Property, Quenching, Rate, Rhenium, Sensitivity, Strain, Structure, Temperature, Transformation, Volume, Wire.

For abstract, see STAR 05 06.
N67-15833 HC$3.00 MF$0.65

DETERMINATION OF THE DIFFUSION COEFFICIENTS IN ALLOYS WITH SEVERAL PHASES.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
For primary bibliographic entry see Field 7D.
For abstract, see STAR 05 06.
N67-16502 HC$3.00 MF$0.65

EFFECT OF 1000 HOUR THERMAL EXPOSURES ON TENSILE PROPERTIES OF REFRACTORY METAL ALLOYS.
Westinghouse Electric Corp., Pittsburgh, Pa. Astronuclear Lab.
G. G. Lessmann. 1966, 68p NASA-CR-92095, WANL-PR-/P/-012
Contract NAS3-2540

Descriptors: *Niobium alloy, *Refractory metal, *Tantalum alloy, *Tensile strength, *Thermal effect, Aging, Alloy, Annealing, Base, Bending, Dependence, Dispersion, Ductility, Effect, Element, Exposure, High temperature, Interstitial, Metal, Niobium, Refractory, Strength, Tantalum, Temperature, Tensile, Thermal, Time, Transition, Welding.

For abstract, see STAR 05 06.
N67-16564 HC$3.00 MF$0.65

PROGRAM OF ANALYTICAL AND EXPERIMENTAL STUDY OF POROUS METAL IONIZERS, VOLUME I SUMMARY REPORT, 5 APR. 1965 - 5 MAY 1966.
TRW Systems, Redondo Beach, Calif. Electric Propulsion Technology Dept.
D. F. Hall, and H. Shelton. 22 Jan 67, 132p NASA-CR-54694, TRW-4429-6013-RO-000
Contract NAS3-7109

Descriptors: *Angular distribution, *Cesium ion, *Emitter, *Ion emission, *Metal ion, *Porous material, Alloy, Aluminum, Angular, Cesium, Distribution, Emission, Function, Ion, Ionizer, Iridium, Material, Measurement, Metal, Molybdenum, Neutral, Niobium, Oxygen, Platinum, Porosity, Rhenium, Rhodium, Silicon, Tungsten.

For abstract, see STAR 05 06.
N67-16572 HC$3.00 MF$0.65

CAVITATION DAMAGE IN LIQUID METALS (POTASSIUM STUDIES) TECHNICAL PROGRESS REPORT, 1 AUG. - 31 OCT. 1966.
Hydronautics, Inc., Laurel, Md.
H. S. Preiser, and S. L. Rudy. 28 Nov 66, 16p NASA-CR-72131, TPR-607-2
Contract NAS3-8506

Descriptors: *Cavitation, *Liquid potassium, *Refractory alloy, Alloy, Contamination, Damage, High temperature, Liquid, Metal, Oxide, Potassium, Refractory, Resistance, Sodium, Stainless, Steel.

For abstract, see STAR 05 06.
N67-16606 HC$3.00 MF$0.65

CONTAMINATION EXPOSURES OF COLUMBIUM AND TANTALUM ALLOY SPECIMENS FINAL REPORT, 25 FEB. 1965 - 15 JUN. 1966.
General Electric Co., Cincinnati, Ohio. Space Power and Propulsion Section.
R. B. Fleming. 15 Jul 66, 135p NASA-CR-54934
Contract NAS3-4169

Descriptors: *Getter, *Niobium alloy, *Oxidation, *Tantalum alloy, *Zirconium alloy, Alloy, Calibration, Composition, Contamination, Distribution, Emission, Exposure, Gas, Gauge, High temperature, Ion, Low pressure, Measurement, Niobium, Pressure, Spectral, Sticking, Tantalum, Zirconium.

For abstract, see STAR 05 06.
N67-16673 HC$3.00 MF$0.65

MASS-TRANSFER EFFECTS IN SOME REFRACTORY-METAL-ALKALI-METAL-STAINLESS STEEL SYSTEMS,
Oak Ridge National Lab., Tenn.
J. R. DiStefano. Nov 66, 28p
Contract W-7405-eng-26

Descriptors: (*Refractory metals, Alkali metals), (*Alkali metals, Stainless steel), Mass transfer.

For abstract, see NSA 21 04.
ORNL-4028 HC$3.00 MF$0.65

MATERIALS COMPATIBILITY AND CORROSION STUDIES FOR THE ARGONNE ADVANCED RESEARCH REACTOR,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 04.
ORNL-4034 HC$3.00 MF$0.65

PRESTRESSED CONCRETE DURABILITY AND CORROSION,
Montana State Univ., Bozeman. Engineering Research Labs.
For primary bibliographic entry see Field 11B.
PB-174 007 HC$3.00 MF$0.65

ETUDE DES TRANSFORMATIONS ALLOTROPIQUES DU PLUTONIUM (Study of Allotropic Transformations in Plutonium).
Doctoral thesis in French,
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
Bernard Spriet. 22 Jun 66, 89p CEA-R-3062
Text in French, attached summary in English.

Descriptors: (*Plutonium, Phase studies), Grain structures (Metallurgy), Crystal structure, Metallography, Dilatometers, Thermal analysis, Resistance (Electrical), Microscopy, Zone melting, Diffusion, Stresses, Transition temperature, Phase diagrams, France.
Identifiers: Allotropy.

The allotropic transformations in plutonium were studied by different methods: metallography, dilatometry, thermal analysis, resistivity measurements, examination with a hot stage microscope. In order to study the importance of the purity, purification process such as zone-melting or electrodiffusion were developed. The characteristics of

the alpha-beta transformation can be explained in terms of the influence of internal stresses on the transition temperature and on the transformation kinetics. Some particular characteristics of delta to gamma, gamma to alpha, delta-epsilon, beta-gamma, and delta to alpha transformations are also given. (Author)
PB-174 029 HC$3.00 MF$0.65

CALCUL DES FORCES AGISSANT SUR UNE IMPURETE D'UN METAL SOUMIS A UN GRADIENT DE TEMPERATURE (Calculation of Forces Acting on an Impurity in a Metal Subjected to a Temperature Gradient),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 20L.
PB-174 047 HC$3.00 MF$0.65

DEVELOPMENT OF METHOD TO IMPROVE THE QUALITY OF CONVENTIONAL MICHIGAN IRON ORES,
Michigan Technological Univ., Houghton. Inst. of Mineral Research.
J. C. Nigro, and M. E. Volin. Dec 65, 61p
Contract Co-6171
Prepared in cooperation with Economic Development Administration, Dept. of Commerce, Washington, D. C.

Descriptors: (*Ores (Metal sources), Processing), (*Iron, Ores (Metal sources)), Acceptability, Michigan, Grinding, Oxygen, Heat treatment, Compacting, Pellets, Porosity.

The iron ore reduction process described in this report is a possible method for improving the grade and structure of conventional Michigan direct shipping ores of the type that have become marginal for blast furnace use in competition with domestic pellets and high-grade foreign ores. The process utilizes internal solid reductant to make partially reduced pellets of high iron content and superior physical properties. Such pellets can serve as feed to the blast furnace, and possibly as part of the charge to cupola or electric furnaces. A small experimental shaft reactor was built to study the process characteristics under continuous operating conditions, measure the heat requirements, and produce enough reduced pellets for evaluation tests. The study was developmental in nature, and no attempt was made to obtain information on process economics. Three direct shipping ores from shaft mines on the Marquette, Gogebic, and Menominee ranges, and one beneficiated concentrate were selected for the study. (Author)
PB-174 055 HC$3.00 MF$0.65

11G. MISCELLANEOUS MATERIALS

DEGREE AND RATE OF CROSSLINKING OF CROSS LINKED POLYETHYLENE,
Dainichi-Nippon Cables Ltd., Amagasaki (Japan).
For primary bibliographic entry see Field 11I.
AD-646 531 HC$3.00 MF$0.65

SOLUTION POLYMERIZED BUTADIENE/STYRENE RUBBERS FOR WIRE AND CABLE APPLICATIONS,
Phillips Petroleum Co., Akron, Ohio. Rubber Chemicals Div.
For primary bibliographic entry see Field 11J.
AD-646 535 HC$3.00 MF$0.65

DESIGN AND MANUFACTURE OF PLASTIC INSULATED ALUMINUM CONDUCTOR TELEPHONE CABLE,
Bell Telephone Labs., Baltimore, Md.
For primary bibliographic entry see Field 17B.
AD-646 541 HC$3.00 MF$0.65

UNDERWATER DEGRADATION OF POLYETHYLENE FOR WIRE INSULATION,
Furukawa Electric Co. Ltd., Yokohama (Japan). Material Lab.
For primary bibliographic entry see Field 11I.
AD-646 545 HC$3.00 MF$0.65

A REVIEW OF POLYOLEFIN TEST REQUIREMENTS IN WIRE AND CABLE SPECIFICATIONS,
Phillips Petroleum Co., Bartlesville, Okla. Plastics Services Div.
For primary bibliographic entry see Field 9A.
AD-646 547 HC$3.00 MF$0.65

CABLE INSULATION THERMAL LIFE STUDIES,
Marine Engineering Lab., Annapolis, Md.
For primary bibliographic entry see Field 9A.
AD-646 548 HC$3.00 MF$0.65

THERMAL STABILITY OF CROSS-LINKED POLYETHYLENE,
Cooke Color and Chemical Co., Hackettstown, N. J.
For primary bibliographic entry see Field 11I.
AD-646 549 HC$3.00 MF$0.65

CHEMILUMINESCENT MATERIALS.
American Cyanamid Co., Stamford, Conn. Central Research Div.
For primary bibliographic entry see Field 7E.
AD-646 641 HC$3.00 MF$0.65

SCREENING AND EVALUATION OF ANTIOZONANTS AND WAXES IN SB-R RUBBER.
Army Engineer Research and Development Labs., Fort Belvoir, Va.
For primary bibliographic entry see Field 11J.
AD-646 750 HC$3.00 MF$0.65

11H. OILS, LUBRICANTS, AND HYDRAULIC FLUIDS

USE OF THIN-LAYER CHROMATOGRAPHY (TLC) FOR IDENTIFICATION OF AIRCRAFT ENGINE OIL COMPONENTS.
Interim rept.,
Naval Research Lab., Washington, D. C.
L. Green, and H. Ravner. 9 Nov 66, 16p NRL-6465

Descriptors: (*Airplane engine oils, *Thin layer chromatography), Contamination, Lubricants, Petroleum, Esters, Silicones, Hydraulic fluids.

Thin-layer chromatography (TLC) using a silica gel adsorbent on a plastic backing, and n-heptane-acetone (95:5) developing solvent, permits useful separation of (a) esters derived from pentaerythritol, dipentaerythritol, and dibasic acids, (b) silicones, and (c) petroleum-based fluids. Esterification mixtures of both pentaerythritol and dipentaerythritol could not be resolved into their respective homologs. With benzene developing solvent, the caproate and valerate of pentaerythritol could be separated; in other respects, the solvent was less satisfactory than n-heptane-acetone because of its tendency to cause streaked chromatograms. Dibasic acid and trimethylolpropane esters could not be differentiated except by saponification and resolution of the liberated acids with benzene-acetone solvent (85:15). TLC shows some promise for rapid, specific separations, e.g., esters and silicones from petroleum-based oils and hydraulic fluids. Even with additional refinements of the method, however, results as precise or complete as those obtained with gas-liquid chromatography (GLC) or nuclear magnetic resonance (NMR) appear improbable. (Author)
AD-646 699 HC$3.00 MF$0.65

MAGNETOHYDRODYNAMIC LUBRICATION FLOW BETWEEN PARALLEL PLATES.
Interim rept.,
Chicago Univ., Ill.
Russell J. Donnelly, E. Roland Maki, and Dennis C. Kuzma. 25 Oct 65, 12p
AFOSR-67-0324
Grant AF-AFOSR-785-65
Prepared in cooperation with General Motors Corp., Warren, Mich. Research Labs.
Availability: Published in Journal of Fluid Mechanics v26 pt3 p537-43 1966.

Descriptors: (*Magnetohydrodynamics, *Lubrication), Thrust bearings, Theory.

The magnetohydrodynamic lubrication flow in an externally pressurized thrust bearing is investigated both theoretically and experimentally. The ordinary magnetohydrodynamic lubrication theory for this bearing is extended to include fluid inertia effects. Very good agreement is obtained between theory and experiment. (Author)
AD-646 806 Not available from CFSTI.

SURVEY OF PRESENT INFORMATION ON ELASTOHYDRODYNAMIC LUBRICATION OF GEARING.
Research and development rept.,
Navy Marine Engineering Lab., Annapolis, Md.
L. G. Schneider. Feb 67, 70p MEL-369/66

Descriptors: (*Lubrication, Hydrodynamics), (*Gears, Lubrication), Naval equipment, Viscosity, Films, Elasticity, Heat, Rheology.

The report is a survey of numerous published theoretical and experimental investigations in elastohydrodynamic lubrication with the intent of establishing their applicability to design and to lubrication investigations related to future high performance Navy gearing. While great progress in understanding the parameters of importance in elastohydrodynamic lubrication has been made, workable solutions for use in normal design are available only for limited conditions which are realized in rolling contact when little or no sliding occurs. In gearing, this condition exists only at the pitch point so that theoretical prediction of oil-film thickness becomes increasingly overly optimistic as tooth contact distance from the pitch line (and thus sliding velocity) increases. (Author)
AD-646 896 HC$3.00 MF$0.65

STUDIES OF LOW AND HIGH TEMPERATURE CAGE MATERIALS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 13H.
For abstract, see STAR 05 06.
N67-16042 HC$3.00 MF$0.65

THE EFFECT OF THE SPACE ENVIRONMENT ON LUBRICANTS AND ROLLING ELEMENT BEARINGS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 13I.
For abstract, see STAR 05 06.
N67-16048 HC$3.00 MF$0.65

11I. PLASTICS

DETECTION OF ROSIN, ROSIN DERIVATIVES, AND PHENOLIC RESIN MODIFICATIONS IN ALKYD COATINGS USING ULTRAVIOLET SPECTROPHOTOMETRY.

Army Coating and Chemical Lab., Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 11C.
For abstract, see [98].
AD-646 383 HC$3.00 MF$0.65

HETEROCHAIN HIGH-MOLECULAR COMPOUNDS. COLLECTION OF ARTICLES: SELECTED ARTICLES,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
E. V. Kuznetsov, R. K. Valdefinov, G. M. Vershinina, A. A. Berlin, and B. N. Liogonkii. 2 Sep 66, 23p FTD-HT-66-118
TT-67-60785
Unedited rough draft trans. of mono. Geterotsepnye Vysokomolekulyarnye Soedineniya. Sbornik Statei, Moscow, 1963 p76-80, 134-8.

Descriptors: (*Heat-resistant plastics, Synthesis (Chemistry)), (*Organic phosphorus compounds, Polymers), (*Organoboranes, Polymers), (*Polyester plastics, Organic phosphorus compounds), (*Polyamide plastics, Organic phosphorus compounds), Polymerization, Condensation reactions, Reaction kinetics, Heat of activation, Films, Fibers (Synthetic), Organic nitrogen compounds, Spectra (Infrared), Viscosity, Thermochemistry, Thermal stability, USSR.

Contents: Phosphorus containing polyesters and polyamides of aliphatic series, by Ye. V. Kuznetsov, R. K. Valdefinov, and G. M. Vershinina; Synthesis and investigation of polymer properties from boron fluoride bisdiazonium - 4.4' diphenyl, by A. A. Berlin, B. N. Liogon'kiy, and V. P. Parini. (Author)
AD-646 447 HC$3.00 MF$0.65

MEASURING PERFORMANCE OF AN EIGHT-INCH CABLE SHEATHING EXTRUDER,
Western Electric Co., Inc., Omaha, Neb.
For primary bibliographic entry see Field 13I.
AD-646 526 HC$3.00 MF$0.65

EFFECT OF EXTRUDER TEMPERATURE PROFILES ON STRESS-CRACK RESISTANCE OF A POLYETHYLENE SHEATHING COMPOUND,
Bell Telephone Labs., Inc., Murray Hill, N. J.
J. R. Apen, and H. N. Padowicz. 1966, 42p

Descriptors: (*Polyethylene plastics, Cracks), Stresses, Plastic coatings, Extrusion, Temperature, Degradation, Electric cables.

Experiments with an 8 in production extruder equipped with a thermocouple instrumented screw have shown the importance of selecting the proper extruder barrel heater settings if environmental stress-crack (ESC) degradation is to be minimized. A group of 2.37 in cable cores were jacketed with a low density polyethylene sheathing compound to determine the effect of various combinations of feed and metering zone barrel temperature settings on the ESC resistance of the polyethylene jacket. An experimental design was used which permitted the estimation of the best fitting second degree response surface. The resulting equation for ESC as a function of feed and metering zone temperatures did not have a single optimum but predicted increasing stress-crack resistance with increasing temperatures as high as the experimental temperatures were carried, which for the metering zone was 520F and for the feed zone was 560F. The ESC time as determined by an accelerated constant strain test on heat aged samples varied from 1.1 to 6.8 hours when changing from the worst to best extruder profile. The effect of the different extruder profiles on the change in melt index was also assessed and in general, melt index changes are minimized with higher barrel temperature settings. (Author)
AD-646 527 HC$3.00 MF$0.65

DEGREE AND RATE OF CROSSLINKING OF CROSS LINKED POLYETHYLENE,
Dainichi-Nippon Cables Ltd., Amagasaki (Japan).
Masaaki Okada. Dec 66, 15p
Prepared for presentation at the Wire and Cable Symposium (15th), Atlantic City, N. J. December 1966.

Descriptors: (*Polyethylene plastics, *Crosslinking (Chemistry)), Electric insulation, Electric wire, Electric cables, Equations, Reaction kinetics.

Chemically crosslinked polyethylene has unique characteristics among crosslinked polymers used industrially. First, the number average molecular weight before crosslinking is very small; second, an appreciable amount of sol is contained in its crosslinked state. In order to obtain precise values of the crosslinkage density in such a material, it is necessary to develop a new technique. A new equation developed is proposed in this paper. It is based on the Flory-Rehner equation, but the number average molecular weight of the polymer prior to crosslinking is modified in terms of sol fraction. Another correction is made considering the distribution of crosslinkages between sol and gel. The new equation was proved to give reliable values over a wide range of crosslinkage density. It has also been proved that the equation is not apt to be grossly affected by a minor experimental error. The rate of crosslinking of polyethylene with dicumyl peroxide is a first order reaction controlled by the rate of thermal decomposition of the peroxide, which is verified by measurements of swelling and sol using the new equation and by measurements with the Agfa Vulcameter. (Author)
AD-646 531 HC$3.00 MF$0.65

SILICONE RUBBER SUITABLE FOR COAXIAL CABLE,
Boston Insulated Wire and Cable Co., Mass.
For primary bibliographic entry see Field 9A.
AD-646 540 HC$3.00 MF$0.65

UNDERWATER DEGRADATION OF POLYETHYLENE FOR WIRE INSULATION,
Furukawa Electric Co. Ltd., Yokohama (Japan). Material Lab.
Tsunemi Yoshida, Moriuni Hasebe, and Teruo Fukuda. 1966, 26p

Descriptors: (*Polyethylene plastics, Degradation), (*Electric insulation, Polyethylene plastics), Electric wire, Underwater, Oxidation, Antioxidants, Plastic coatings.

Underwater degradation of polyethylene insulation is initiated with oxidation caused by oxygen dissolved in the water and then is propagated with the growth of cracks caused by water permeation. And to prevent degradation of polyethylene insulated wire, especially for underwater use, it is believed desirable to use a wire which consists of a tin-plated conductor and a coating of polyethylene, crosslinked if possible, containing optimum antioxidant and minimum internal stresses. (Author)
AD-646 545 HC$3.00 MF$0.65

A REVIEW OF POLYOLEFIN TEST REQUIREMENTS IN WIRE AND CABLE SPECIFICATIONS,
Phillips Petroleum Co., Bartlesville, Okla. Plastics Services Div.
For primary bibliographic entry see Field 9A.
AD-646 547 HC$3.00 MF$0.65

CABLE INSULATION THERMAL LIFE STUDIES,
Marine Engineering Lab., Annapolis, Md.
For primary bibliographic entry see Field 9A.
AD-646 548 HC$3.00 MF$0.65

THERMAL STABILITY OF CROSS-LINKED POLYETHYLENE,
Cooke Color and Chemical Co., Hackettstown, N. J.
Allen C. Bluestein, and John C. Henderson. 1966, 8p
Prepared for presentation at Wire and Cable Symposium (15th), Atlantic City, N. J., December 1966.

Descriptors: (*Polyethylene plastics, Thermal stability), (*Electric insulation, Polyethylene plastics), Quinolines, Antioxidants, Polymers, Aging (Materials), Electric wire.

The investigation demonstrated the fact that many different forms of polymerized trimethyl dihydro quinoline are available and that the 150C. oven aging characteristics of cross-linked polyethylene are sometimes affected by which of the various forms is employed. Thorough dispersion of the antioxidant is critically essential. Melting point, by itself is, in general, of little consequence and the volatile loss of antioxidant is of somewhat minor significance. Indications were shown that some parameters other than those discussed here are involved in the effectiveness of PTDQ as a high temperature antioxidant for cross-linked polyethylene. Although this work here was entirely on cross-linked polyethylene and polymerized trimethyl dihydroquinoline the principles involved should clearly apply to other polymer/antioxidant systems. (Author)
AD-646 549 HC$3.00 MF$0.65

FOREST PRODUCTS LABORATORY LIST OF PUBLICATIONS ON MODIFIED WOODS, PAPER-BASE LAMINATES, AND REINFORCED PLASTIC LAMINATES.
Forest Products Lab., Madison, Wis.
Dec 66, 20p
Prepared in cooperation with Wisconsin Univ., Madison.

Descriptors: (*Laminated plastics, Reinforcing materials), (*Glass textiles, Laminated plastics), Wood, Laminates, Plywood, Wood pulp, Composition board, Lignin, Catalogs.

This is a partial listing of literature prepared at the U.S. Forest Products Laboratory on modified woods, paper-base laminates, and reinforced plastic laminates. The first two classes of material are essentially modifications of wood or of pulp and paper products. Most of the reports on reinforced plastic laminates are based on laminates reinforced with glass fibers and represent research done in cooperation with Defense Agencies.
AD-646 570 HC$3.00 MF$0.65

A METHOD OF PRODUCING PHOSPHORUS-CONTAINING POLYESTERS,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
V. I. Kodolov, and S. S. Spasskii. 31 Oct 66, 7p
FTD-HT-66-95
Unedited rough draft trans. of Patent (USSR) 170 663, appl. 888639/23-5, 16 Mar 64.

Descriptors: (*Polyester plastics, Production), (*Phosphorus, Polyester plastics), Polymerization, Inhibition, Condensation, Chlorides, Patents, USSR.

The object of the invention is a method of producing phosphorus-containing polyesters by polycondensation of phosphoric dichlorides with dioxy compounds. It is different in that, to produce phosphorus-containing polyesters with double bonds along the ends of the chain and also to expand the assortment of unsaturated phosphorus-containing polyesters, chloroanhydrides of an unsaturated acid (for example, methacrylic) are added to the reaction mixture.
AD-646 711 HC$3.00 MF$0.65

THERMOGRAVIMETRY OF PHENOL-FORMALDEHYDE POLYCONDENSATES.
Air Force Materials Lab., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 7D.
AD-646 897 HC$3.00 MF$0.65

THE IMPROVEMENT OF ENCAPSULATING FOAMS AND QUALITY ASSURANCE OF POTTING PLASTIC.
Technical memo.,
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
G. A. F. Winckler, and R. C. Evans. Aug 66, 39p
TG-817
Contract NOw-62-0604

Descriptors: (*Expanded plastics, *Encapsulation), (*Embedding substances, Test methods), Circuits, Damage, Pressure, Viscosity, Hardening, Catalysts, Quality control, Dielectric properties, Resistance (Electrical), Density, Instruction manuals.

Plastic foams used for encapsulating electronic circuits may, during their formation, exert sufficient pressures to damage components and connective wiring. This probably caused by the increasing viscosity of the plastic while gas is still being generated. The danger may be alleviated by altering the formulation chemically so that gas generation is completed before the plastic begins to harden. The consequences which would result from the use of a mislabelled or substandard can of potting plastic in flight hardware are so serious that each can must be individually tested to eliminate that possibility. This may readily be accomplished by casting a test disk and then measuring its dielectric constant, volume resistivity, surface resistivity and density. The electrical testing can be performed in less than ten minutes and is, therefore, feasible as a standard quality assurance procedure. (Author)
AD-646 915 HC$3.00 MF$0.65

11J. RUBBERS

SOLUTION POLYMERIZED BUTADIENE/STYRENE RUBBERS FOR WIRE AND CABLE APPLICATIONS,
Phillips Petroleum Co., Akron, Ohio. Rubber Chemicals Div.
J. F. Svetlik, E. F. Ross, and D. D. Dearmont.
1966, 17p
Prepared for presentation at The Annual Wire and Cable Symposium (15th), Atlantic City, N. J., Dec. 7-9, 1966.

Descriptors: (*Synthetic rubber, *Polymerization), (*Electric insulation, Synthetic rubber), Solutions, Butadienes, Styrene plastics, Polymers, Electric wire, Electric cables.

A new family of solution butadiene/styrene copolymers was shown to possess unique attributes not attainable with SBR. Blends of block and random copolymers yield excellent processing and extrusion characteristics, superior low temperature properties, much better aging resistance, and better electrical properties than SBR. The work reported was restricted to commercially available rubbers. Numerous other types of copolymers can be prepared by the solution technique which possess other interesting attributes. By knowing the end-product requirements and relating these to basic properties of the rubbers, it is possible to design polymers to meet almost any requirement. (Author)
AD-646 535 HC$3.00 MF$0.65

WATER STABILITY OF FILLED ELASTOMERS,
Sumitomo Electric Industries, Ltd., Osaka (Japan).
T. Shiga, and M. Hirutani. 9 Dec 66, 10p
Prepared for presentation at the Annual Wire and Cable Symposium (15th), Atlantic City, N. J., December 7, 8 and 9 1966.

Descriptors: (*Electric insulation, Elastomers), (*Elastomers, Stability), (*Butyl rubber, Stability), Hydrolysis, Curing agents, Additives, Water, Absorption, Thickness, Resistance (Electrical), Leakage (Electrical), Diffusion, Partial differential equations, Talc, Electric cables.

The effects of water on the electrical properties of filled elastomers were studied. The rate of decrease of insulating resistance of butyl rubber cured with quinondioxime is not directly related with the amount of apparent water absorbed but depends on the amount and kind of filler used, and it is in inverse proportion to the square of thickness below 80C but it is not related with thickness over 120C. After these experiments, the theoretical treatment of the effect of the amount of absorbed water and diffusion coefficient on electrical resistivity was carried out. Regards the relation between moisture absorption and the dissipation factors of several kinds of rubber it was found that peroxide-cured EPDM filled with talc showed the peak value of dissipation factor at the first stage of moisture absorption. This is a reversible phenomenon. The frequency dependency on the dissipation factors of samples absorbing moisture, was measured. (Author)
AD-646 539 HC$3.00 MF$0.65

SILICONE RUBBER SUITABLE FOR COAXIAL CABLE,
Boston Insulated Wire and Cable Co., Mass.
For primary bibliographic entry see Field 9A.
AD-646 540 HC$3.00 MF$0.65

SCREENING AND EVALUATION OF ANTIOZONANTS AND WAXES IN SB-R RUBBER.
Interim rept. for Jan 62-Sep 64,
Army Engineer Research and Development Labs., Fort Belvoir, Va.
Philip Mitton, and Paul E. Gatza. Nov 66, 43p
AERDL-1878

Descriptors: (*Synthetic rubber, *Additives), Elastomers, Waxes, Antioxidants, Effectiveness, Degradation, Aging (Materials), Inhibition, Ozone, Cracks.

The report covers an investigation to determine the effectiveness of various antiozonants and anti-checking waxes, both individually and in combination, in preventing ozone cracking and deterioration of SB-R rubbers caused by atmospheric ozone attack and by exposure to extreme climatic conditions. Test sheets, 2 inches by 6 inches by 0.080 inch, of Naugapol 1023, each containing either one of 9 antiozonants or one of 11 waxes were subjected to accelerated ozone exposure and evaluated for resistance to deterioration and cracking. Samples of 18 compounds, each containing various combinations of the most promising antiozonants and waxes selected from the above candidates, were exposed at Fort Belvoir, Virginia; Fort Wainwright, Alaska; and Yuma, Arizona, for 8, 16, and 24 months. The specimens were elongated 0, 10, and 20% during exposure and examined periodically for evidence of cracking. Physical properties determined after each exposure period were compared with initial results and data from other accelerated aging tests performed in the laboratory. The results of all tests were analyzed to ascertain the relative effectiveness of these ozone deterioration inhibiting systems when used in military end items requiring SB-R rubber components. (Author)
AD-646 750 HC$3.00 MF$0.65

11L. WOOD AND PAPER PRODUCTS

EFFECT OF INORGANIC SALTS ON PYROLYSIS OF WOOD, ALPHA-CELLULOSE, AND LIGNIN DETERMINED BY DYNAMIC THERMOGRAVIMETRY.
Research paper,
Forest Products Lab., Madison, Wis.
Walter K. Tang. Jan 67, 20p FPL-71

Descriptors: (*Wood, Pyrolysis), (*Cellulose, Pyrolysis), (*Lignin, Pyrolysis), (*Flammability, Inhibition), Additives, Sodium compounds, Borates, Sodium chloride, Potassium compounds, Carbonates, Aluminum compounds, Chlorides, Ammonium compounds, Phosphates, Thermogravimetric analysis, Vaporization, Reaction kinetics, Heat of activation, Fire safety, Finishes + finishing.
Identifiers: Aluminum chlorides, Ammonium phosphates, Potassium bicarbonate, Sodium borates.

Dynamic thermogravimetric analyses were conducted under vacuum on pyrolysis of wood, of alpha-cellulose, and of lignin, untreated and treated with 2 percent by weight of five inorganic salts. Data for weight loss and for rate of weight loss were obtained to indicate the principal decomposition ranges for the wood and the wood components, the effect of the chemicals on volatilization at various temperature ranges, and the kinetics of the decomposition reactions. The difference method of Freeman and Carroll was first examined as a means for obtaining the order of the reactions, the frequency factors, and the activation energies. However, because of amplified errors in this method, a pseudo first-order Arrhenius plot was finally used for determining frequency factors and activation energies. (Author)
AD-646 562 HC$3.00 MF$0.65

A HORIZONTAL MACHINE FOR TESTING STRUCTURAL WOOD ELEMENTS IN TENSION.
Forest Products Lab., Madison, Wis.
For primary bibliographic entry see Field 14B.
AD-646 564 HC$3.00 MF$0.65

GLUING AMMONIUM - SALT - TREATED SOUTHERN PINE WITH RESORCINOL-RESIN ADHESIVES.
Research note,
Forest Products Lab., Madison, Wis.
R. E. Schaeffer. Jan 67, 20p FPL-0151

Descriptors: (*Wood, *Bonding), (*Adhesives, Effectiveness), Additives, Ammonium compounds, Flammability, Inhibition, Resorcinol, Joints, Mechanical properties, Failure (Mechanics), Shear stresses, Beams (Structural).

A comparison was made of the quality of bond produced by three commercial resorcinol-resin glues used on ammonium-salt-treated and untreated southern pine. The three adhesives were used on both the treated and the untreated specimens and had a postcuring period of 2 months before testing. The three adhesives, with two assembly times, 20 minutes and 60 minutes, and with two curing temperatures, 80F and 150F., provided for 12 combinations of variables. The joints of the bonded-untreated southern pine had significantly greater shear strength and greater wood failure than the joints of the bonded-treated pine. The percentage of delamination was significantly lower in the glued specimens of untreated pine than in their treated counterparts. The ammonium-salt fire retardants appeared to react with the resorcinol-resin glues. Glue increased in viscosity more rapidly on surfaces of the treated wood than on the corresponding surfaces of the untreated wood. Less glue was squeezed from the gluelines of the treated specimens. The glues with liquid hardeners appeared to spread and wet the treated surfaces more readily. (Author)
AD-646 565 HC$3.00 MF$0.65

EFFECT OF PANEL THICKNESS AND NON-COMBUSTIBLE INSERTS ON SURFACE FLAMMABILITY OF PLYWOOD.
Research note,
Forest Products Lab., Madison, Wis.
E. L. Schaffer. Jan 67, 7p FPL-0152

Descriptors: (*Plywood, Flammability), Thickness, Fire resistant materials, Asbestos, Aluminum, Sheets, Sandwich construction.

Douglas-fir plywood in 1/4- to 1-inch thicknesses was evaluated for flame-spread resistance in the 8-foot tunnel furnace test, corner-wall test, and mild Schlyter test. Under these methods no significant effect on flame-spread resistance was obtained by varying panel thickness. Work with non-combustible inserts showed that 1/32-inch asbestos or aluminum sheets employed with thin face veneers in panel constructions could significantly reduce surface flammability. (Author)
AD-646 566 HC$3.00 MF$0.65

COMPARATIVE DECAY RESISTANCE OF HEARTWOOD OF NATIVE SPECIES.
Forest Products Lab., Madison, Wis.
For primary bibliographic entry see Field 2F.
AD-646 567 HC$3.00 MF$0.65

FACTORS INFLUENCING DECAY OF UNTREATED WOOD.
Forest Products Lab., Madison, Wis.
For primary bibliographic entry see Field 2F.
AD-646 568 HC$3.00 MF$0.65

FOREST PRODUCTS LABORATORY LIST OF PUBLICATIONS ON MODIFIED WOODS, PAPER-BASE LAMINATES, AND REINFORCED PLASTIC LAMINATES.
Forest Products Lab., Madison, Wis.
For primary bibliographic entry see Field 11I.
AD-646 570 HC$3.00 MF$0.65

12. MATHEMATICAL SCIENCES

12A. MATHEMATICS AND STATISTICS

STEADY-STATE CONDITIONS IN AN EXPLOSIVE WHICH IS SUBJECTED EXTERNALLY TO ELEVATED TEMPERATURES.
Picatinny Arsenal, Dover, N. J. Feltman Research Labs.
For primary bibliographic entry see Field 19A.
AD-459 600 HC$3.00

SMOOTH REGRESSION ANALYSIS,
Johns Hopkins Univ., Baltimore, Md.
Geoffrey S. Watson. 1964, 16p
Contract Nonr-4010 (09)

Descriptors: (*Graphics, Numerical analysis), (*Numerical analysis, Computers), Probability, Density, Fourier analysis, Least squares method, Biology, Integral transforms.
Identifiers: Biometry.

Few would deny that the most powerful statistical tool is graph paper. When, however, there are many observations (and/or many variables) graphical procedures become tedious. It seems to the author that the most characteristic problem for statistians at the moment is the development of methods for analysing the data poured out by electronic observing systems. The present paper gives a simple computer method for obtaining a 'graph' from a large number of observations. (Author)
AD-467 119 HC$3.00 MF$0.65

THE ASYMPTOTIC PROPERTIES OF A BIVARIATE LAPLACE TRANSFORM,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
V. M. Chernov. 17 Nov 66, 15p FTD-HT-66-548
TT-67-60765
Asimptoticheskie Svoistva Dvumernogo Preobrazovaniya Laplasa, unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Matematika (USSR), n1 p158-67 1965.

Descriptors: (*Integral transforms, *Asymptotic series), Groups (Mathematics), Series, Theorems, Complex variables, Real variables, Measure theory, USSR.
Identifiers: Operational calculus.

The question of the limiting relationships of the bivariate Laplace transform is examined. Theorems of limiting relationships are applied to two transforms and they are found to be unilateral for one variable. Abelian and Tauberian theorems are employed to obtain limiting relationships of another character. Two examples are given. (Author)
AD-646 364 HC$3.00 MF$0.65

A COMPARISON OF AVERAGE LIKELIHOOD AND MAXIMUM LIKELIHOOD RATIO TESTS FOR DETECTING RADAR TARGETS OF UNKNOWN DOPPLER FREQUENCY,
RAND Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 17I.
For abstract, see [707].
AD-646 366 HC$3.00 MF$0.65

MULTIVARIATE REGRESSION WITH ONE STOCHASTIC PREDICTOR VARIABLE.
Technical rept.,
Stanford Univ., Calif. Dept. of Statistics.
Stanley L. Sclove. 30 Dec 66, 15p TR-124
Contract Nonr-225 (52)
See also AD-646 427.

Descriptors: (*Multivariate analysis, *Stochastic processes), (*Regression analysis, Stochastic processes), Random variables, Mathematical prediction, Distribution functions, Monte Carlo method.

Estimators are obtained which dominate the maximum likelihood estimator for the parameters in the regression of at least three dependent variables on one stochastic independent variable, these variables being jointly normally distributed. The loss function corresponds to that for the following problem: given a random sample of N observations from the joint normal distribution of all the variables and an additional independent observation on the independent variable, to predict the corresponding value of the dependent variables, when the loss function is the conditional mean square of the distance between the predicted and the actual values in the metric of the residual covariance matrix, given the sample of N observations. It is proved that the maximum likelihood estimator is admissible when there are only two dependent variables and the means of the dependent variables and independent variable are known. (Author)
AD-646 444 HC$3.00 MF$0.65

ESTIMATES OF THE REMAINDERS OF HILL'S SERIES,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 3C.
AD-646 449 HC$3.00 MF$0.65

THE EPSILON-ENTROPY AND EPSILON-CAPACITY OF CERTAIN TIME-VARYING CHANNELS,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
For primary bibliographic entry see Field 9D.
AD-646 472 Not available from CFSTI.

DETERMINABLE CLASSES OF CHANNELS,
Michigan Univ., Ann Arbor.
For primary bibliographic entry see Field 9D.
AD-646 473 Not available from CFSTI.

A MULTIDIMENSIONAL SAMPLING THEOREM,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
For primary bibliographic entry see Field 9D.
AD-646 480 Not available from CFSTI.

RANDOM SAMPLING OF RANDOM PROCESSES: MEAN-SQUARE COMPARISON OF VARIOUS IINTERPOLATORS.
Revised ed.,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
O. A. Z. Leneman, and J. B. Lewis. 11 Apr 66, 8p
Revision of manuscript submitted 27 Dec 65.
Availability: Published in IEEE Transactions on Automatic Control vAC-11 n3 p396-403 Jul 1966.

Descriptors: (*Stochastic processes, *Monte Carlo method), Interpolation, Information theory, White noise, Optimization, Bandwidth, Sampling.

The paper compares the relative merits (in the mean-square sense) of the zero-order hold, the exponential hold, and the polygonal hold vs. a linear nonrealizable interpolation procedure. This comparison is done for three sampling schemes; periodic sampling, periodic sampling with skips, and Poisson sampling. General expressions for the mean-square error are given in terms of the second-order statistics of the weakly stationary sampled process and in terms of the statistics associated with the sampling procedure. For purposes of illustration, the sampled process is assumed to be either a wide-sense Markov process or a band-limited white noise process; the results obtained for these cases are plotted and lead to simple conclusions which are of interest in the theory of interpolation. (Author)
AD-646 488 Not available from CFSTI.

A HIGH-SPEED SERIAL ADDER OF THE INTERMEDIATE TYPE,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 9B.
AD-646 506 HC$3.00 MF$0.65

LEAST SQUARES CURVE FITTING BY COMPUTER: A LEAST SQUARES ITERATIVE TECHNIQUE IS DEVELOPED TO SOLVE MULTIPLE LINEAR REGRESSION PROBLEMS FOR n-DIMENSIONAL CURVE FITTING BY USE OF FORTRAN IV SUBROUTINES.
Technical memo.,
Naval Missile Center, Point Mugu, Calif.
C. O. Archer. 20 Jan 67, 67p NMC-TM-66-59

Descriptors: (*Curve fitting, *Digital computers), (*Least squares method, Curve fitting), Iterative methods, Regression analysis, Computer programs, Programming languages, Compilers, Flow charting, Polynomials.
Identifiers: FORTRAN, IBM 7094.

A Fortran IV subroutine (CURFIT) for curve fitting by multiple linear regression has been designed for the IBM 7094 digital computer. This subroutine may be used in the body of other programs without adding sigificantly to the execution time. The report presents the CURFIT subroutine

and supplemental subroutines that prepare data for curve fitting in polynomial form, where the polynomials may be functions of one, two, or three independent variables. The mathematical theory for solving multiple linear regression problems in the least squares sense is presented. Subroutines are described for: (1) Fitting a polynomial of one, two, or three degrees of arbitrary order to data which come from some line, surface, or hypersurface. (2) Plotting functions of one or two independent variables. Examples are presented for one-, two-, and three-degree polynomial fits. Also, the report shows how the subroutines may be adapted for solution of special problems and situations. Complete flow charts and Fortran IV listings of all of the described subroutines are presented. (Author)
AD-646 511 HC$3.00 MF$0.65

ON THE EQUIVALENCE OF LINEARIZED KALMAN FILTERS.
Technical note,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Michael Athans. 11 Jan 67, 26p TN-1967-6
ESD-TR-67-20
Contract AF 19 (628)-5167, ARPA Order-498

Descriptors: (*Approximation (Mathematics), Numerical analysis), (*Trajectories, *Numerical analysis), Equations of motion, Nonlinear systems.
Identifiers: Kalman filters.

The purpose of this note is to examine the relationships of the Kalman filters which can be used to estimate the linearized state of two different state-variable representations of the same nonlinear system. It is shown that, to within first order effects, the choice of the coordinate system for the construction of the Kalman filter is immaterial. (Author)
AD-646 550 HC$3.00 MF$0.65

A MATCHING PROCEDURE FOR W-ORDER LOGIC,
Applied Logic Corp., Princeton, N. J.
William Eben Gould. 15 Oct 66, 37p Scientific-4
AFCRL-66-781
Contract AF 19 (628)-3250, ARPA Order-700
See also AD-619 301.

Descriptors: (*Mathematical logic, *Algorithms), Man-machine systems, Computers, Metamathematics.

Formation rules are presented for an W-order logic with lambda operator in which each term has a well defined type. Transformation rules are given defining lambda-conversion, special conversion, substitution, and alphabetic change of bound variables. The notion of one term being an 'instance' of another is then defined using these transformation rules. The main problem of the paper is to develop a 'matching procedure' for pairs of terms, so that every common instance of the two given terms is an instance of some term produced by the matching procedure. This is accomplished by analysing the terms according to the formation rules, matching the outermost parts first, then proceeding inductively inward. Examples are given to show that an infinite set of terms may be needed for this purpose. Conditions under which such an infinite set is needed are discussed. A procedure is developed for producing at least one common instance, if one exists. (Author)
AD-646 560 HC$3.00 MF$0.65

CHITRAN - A 7030 (STRETCH) COMPUTER PROGRAM FOR THE CHI-SQUARE TEST OF NORMALITY.
Technical memo.,
Naval Weapons Lab., Dahlgren, Va.
Gary W. Gemmill, Travis L. Herring, and Ralph L. Shade. Jan 67, 59p NWL-TM-K-2/67

Descriptors: (*Computer programs, *Statistical tests), (*Distribution theory, Sampling), Statistical distributions, Stochastic processes, Programming languages.
Identifiers: CHITRAN, IBM 7030, FORTRAN, Normal distribution, Random sample.

The CHITRAN program computes the Chi-square statistic for testing the hypothesis that a random sample is from a normal population. Also given are the degrees of freedom for the Chi-square statistic, a bar chart (frequency distribution), the mean, standard deviation, range, maximum, and the minimum of the observations comprising the sample. Eleven transformations on the observations are possible before the calculations are performed. An optional feature, 'pooling,' allows the grouping of samples in order to obtain a single Chi-square statistic for the grouped (pooled) data. CHITRAN is written in FORTRAN IV for the IBM 7030 (STRETCH) computer. (Author)
AD-646 577 HC$3.00 MF$0.65

AN ALGOL CONVOLUTION PROCEDURE BASED ON THE FAST FOURIER TRANSFORM.
Research memorandum,
Stanford Research Inst., Menlo Park, Calif. Mathematical Sciences Dept.
Richard C. Singleton. Jan 67, 15p

Descriptors: (*Integral transforms, Algorithms), (*Vector analysis, *Algorithms), Computer programs, Programming languages, Fourier analysis, Series.
Identifiers: ALGOL.

The body of the report was written as a contribution to the Algorithm section of the Communications of the ACM, and consists of three ALGOL procedures with comments. Two fast Fourier transform procedures, FASTFOURIERS and REVERSEFOURIERC, are included because of their use by procedure CONVOLUTION, but can be used independently. Procedure CONVOLUTION computes the convolution of two real vectors A and B of period n. If a noncircular convolution is wanted, the data vectors are extended by adding zeros before computing. The convolution is computed by first transforming A and B to Fourier coefficient vectors alpha and beta forming the complex conjugate product alpha beta, then computing the Fourier transform of alpha beta. The result of the final step is the desired convolution. Computing time for this method increases as n log 2 n, as compared to n2 for the direct method of computing lagged products. Tests show a 10 to 1 time advantage for the transform method at n = 256.
AD-646 628 HC$3.00 MF$0.65

THE USE OF METHOD-OF-MOMENTS ESTIMATES IN CHI-SQUARE TESTS FOR GOODNESS OF FIT,
RAND Corp., Santa Monica, Calif.
Albert Madansky. Jan 67, 24p RM-4524-PR
Contract F44620-67-C-0045

Descriptors: (*Statistical tests, *Distribution theory), Probability density functions, Random variables, Statistical analysis, Statistical distributions.
Identifiers: Likelihood, Moments method.

In the memorandum the author shows how different methods of estimating the unknown parameters affect the chi-square statistic in the goodness of fit test.
AD-646 632 HC$3.00 MF$0.65

AN APPLICATION OF METHODS OF FUNCTION MINIMISATION TO A PROBLEM OF NON-LINEAR CURVE FITTING ARISING IN THE ESTIMATION OF GEOPHYSICAL CONSTANTS FROM SATELLITE OBSERVATIONS.
Royal Aircraft Establishment, Farnborough (England).
For primary bibliographic entry see Field 8E.
AD-646 640 HC$3.00 MF$0.65

ALL UNION CONFERENCE-SEMINAR ON THE THEORY AND METHODS OF USING MATHEMATICAL MODELS. TRANSACTIONS.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 9B.
AD-646 712 HC$3.00 MF$0.65

RISK, AMBIGUITY, AND THE SAVAGE AXIOMS,
RAND Corp., Santa Monica, Calif.
Daniel Ellsberg. Aug 61, 43p P-2173

Descriptors: (*Probability, *Decision theory), Decision making, Behavior, Mathematical prediction.

A class of choice-situations is indicated in which many otherwise reasonable people neither wish nor tend to conform to the Savage postulates, nor to the other axiom sets that have been devised.
AD-646 719 HC$3.00 MF$0.65

A MATHEMATICAL PROGRAMMING MODEL FOR OPTIMUM DESIGN OF OPEN PIT ORE MINES.
Carnegie Inst. of Tech., Pittsburgh, Pa. Management Sciences Research Group.
For primary bibliographic entry see Field 8I.
AD-646 724 HC$3.00 MF$0.65

SOME STATISTICAL TREATMENTS COMPATIBLE WITH INDIVIDUAL ORGANISM METHODOLOGY.
Army Medical Research Lab., Fort Knox, Ky. Biophysics Div.
For primary bibliographic entry see Field 6C.
AD-646 751 HC$3.00 MF$0.65

ON ENTIRE FUNCTIONS OF EXPONENTIAL TYPE AND INDICATORS OF ANALYTIC FUNCTIONALS.
Interim rept.,
Institute for Advanced Study, Princeton, N. J.
C. O. Kiselman. 1967, 38p
AFOSR-67-0264
Grant AF-AFOSR-359-64

Descriptors: (*Functions, Potential theory), Exponential functions, Analytic functions, Complex variables, Topology, Convex sets, Functional analysis.
Identifiers: Manifolds (Mathematics).

The main part of the paper is devoted to a study of carriers of an analytic functional mu which are minimal with respect to inclusion in the family of all those carriers of mu which are convex in a certain sense. Such topics as: (1) plurisubharmonic functions, (2) an existence theorem for entire functions of the exponential type, (3) properties of supports of analytic functionals, (4) the indicator of an analytic functional are covered.
AD-646 761 HC$3.00 MF$0.65

TABLES OF SPHEROIDAL WAVE FUNCTIONS. PART I. OBLATE RADIAL FUNCTIONS OF THE FIRST AND SECOND TYPE.
Interim rept.,
Naval Research Lab., Washington, D. C.
S. Hanish, Carolyn Shely, and R. V. Baier. 23 Dec 66, 400p NRL-6472

Descriptors: (*Wave functions, Tables), Electromagnetic waves, Mechanical waves, Acoustics, Scattering, Diffraction, Geometry, Underwater sound.

The theory of oblate spheriodal wave functions is briefly reviewed and a list of literature references to applications of oblate spheroidal theory is furnished. Formulas useful for the numerical calculation of oblate radial functions of the first and second type, together with their first derivatives, are derived and explained. A step-by-step procedure of computation is then outlined together with an indication of precision obtained and method of checking. Finally a computer-printout tabulation of 72,300 entries comprising radial functions and their derivatives is reproduced. The range of parameters m, l, h, and xi covered in these tables is m = 0 (1) 4, l = m (1) 8, h = 0.1 (0.1) 1 (0.2) 8, and xi = 0.1 (0.1) 0.9. To these are added several special sections. A special section xi = 0 covers all the above ranges of h and l for m = 0 (1) 8. Another section xi = 0 covers the above range of h for m = 0, 1 and l = 9 (1) 18.
AD-646 793 HC$3.00 MF$0.65

ON TRUNCATION ERRORS FOR CONTINUED FRACTION COMPUTATIONS.
Revised ed.,
Arizona State Univ., Tempe. Dept. of Mathematics.
E. P. Merkes. 26 Mar 66, 14p
AFOSR-67-0357
Grant AF-AFOSR-371-63
Prepared in cooperation with Cincinnati Univ., Ohio. Dept. of Mathematics. Revision of manuscript submitted 7 Sep 65.
Availability: Published in J. Siam Numer. Anal. v3 n3 p486-96 1966.

Descriptors: (*Continued fractions, *Algorithms), Errors, Sequences, Inequalities, Complex numbers, Numerical analysis, Convergence.
Identifiers: Round-off errors.

One convenient feature in evaluating a convergent continued fraction with positive elements is that the approximants f sub n are alternately less than and greater than its value f. Therefore a simple estimate of the error f - f sub n is available for each positive integer n. With other conditions on the elements of the continued fraction, however, an estimate of the truncation error is seldom as easy to obtain although results have been given in some cases. This paper is concerned with a more general, and yet practical, method for this problem based on the theory of chain sequences. This estimate of the truncation error is applicable to a wide class of continued fractions. The formulas use Euler's algorithm for generating the approximants, and can be readily adjusted for other computational algorithms. (Author)
AD-646 803 Not available from CFSTI.

PROOFS OF SOME CONJECTURES ON PERMANENTS.
Interim rept.,
Yeshiva Univ., New York.
Elliott H. Lieb. Feb 66, 11p
AFOSR-67-0321
Grant AF-AFOSR-713-64
Prepared in cooperation with Northeastern Univ., Boston, Mass. Dept. of Physics.
Availability: Published in Journal of Mathematics and Mechanics v16 n2 p127-34 Aug 1966.

Descriptors: (*Determinants, Theorems), Matrix algebra, Inequalities, Combinatorial analysis.

The characteristics of Hermitian, positive semi-definite (h.p.s.d.) matrices and the permanents of square matrices are discussed in terms of their size and classical inequalities. Two conjectures are those developed to the status of theorems relating to the form of h.p.s.d. matrices. (Author)
AD-646 804 Not available from CFSTI.

TABLES OF CONFIDENCE INTERVALS FOR BINOMIAL DISTRIBUTION OF SAMPLE SIZE 2 TO 25 INCLUSIVE, AT VARIOUS LEVELS OF CONFIDENCE,
Pacific Missile Range, Point Mugu, Calif.
E. Neuron. 17 Jul 59, 31p PMR-MP-59-22

Descriptors: (*Tables, Confidence limits), (*Binomials, *Confidence limits), Statistical distributions, Probability.
Identifiers: Binomial distribution.

The tables presented in the publication owe their existence to the need of evaluators of military equipment for confidence intervals on binomial distributions of small sample sizes. These tables offer sample sizes from 2 to 25 inclusive and confidence coefficients from 50% to 99% inclusive. To use the tables, it is assumed that an experiment has been conducted using a random sample of size n, r of which have exhibited a specified property. A confidence coefficient must be agreed upon; this confidence coefficient establishes the certainty which one is willing, or able, to place on the estimation of the relative size of that portion of the sampled population which exhibits the specified property. Selecting the table of the proper confidence coefficient, enter the column headed by the proper size n and move down the column until the row marked by r on the left is reached. The two numbers in that row are the boundary values of the confidence limit on the probability of the specified property appearing in any one trial.
AD-646 815 HC$3.00 MF$0.65

ON THE INVERSE OF THE OPERATOR a (.)=A (.) + (.) B,
California Univ., Berkeley. Electronics Research Lab.
J. P. Jacob, and E. Polak. 1966, 5p
AFOSR-67-0343
Grants AF-AFOSR-139-64, NsG-354 (S-1)
Availability: Published in American Mathematical Monthly v73 n4 p388-90 Apr 1966.

Descriptors: (*Operators (Mathematics), Theory), Matrix algebra, Vector spaces, Mapping (Transformations).
Identifiers: Operator's inverse, Eigenvalues.

The paper presents the necessary and sufficient conditions for the operator a to have an inverse. Although these conditions are well known, the paper presents a new proof, which may have pedagogical advantages for its simplicity. (Author)
AD-646 835 Not available from CFSTI.

THE NUMBER OF TERMS IN THE GENERAL GAIN FORMULAS FOR COATES AND MASON SIGNAL FLOW GRAPHS,
California Univ., Berkeley. Electronics Research Lab.
For primary bibliographic entry see Field 9A.
AD-646 838 Not available from CFSTI.

THE GENERALIZED VARIANCE: TESTING AND RANKING PROBLEMS,
Chicago Univ., Ill.
Morris L. Eaton. 1967, 8p
Contract Nonr-2121 (23), Grant NSF-GP-3707
Prepared in cooperation with Stanford Univ., Calif., Grant NSF-GP-3837.

Descriptors: (*Statistical tests, *Multivariate analysis), Probability density functions, Random variables, Monte Carlo method, Decision theory, Minimax technique.

The note shows that, for a sample from a multivariate normal distribution, the density function of the sample generalized variance possesses a monotone likelihood ratio. This result is used to construct a uniformly most powerful invariant test for a testing problem concerning the population generalized variance. Also, the result is applied to the problem of ranking multivariate normal populations according to the size of their generalized variances. (Author)
AD-646 839 HC$3.00 MF$0.65

DECOMPOSITION THEOREM FOR BOUNDED UNIFORMLY CONTINUOUS FUNCTIONS ON A GROUP,
Massachusetts Inst. of Tech., Cambridge.
A. W. Knapp. 1 Sep 65, 18p
AFOSR-67-0263
Grant AF-AFOSR-335-63
Research supported in part by NSF.
Availability: Published in American Journal of Mathematics v88 n4 p902-14 Oct 1966.

Descriptors: (*Groups (Mathematics), Functions), (*Theorems, *Functions), Algebras, Topology, Invariance, Operators (Mathematics), Functional analysis, Set theory.
Identifiers: Decomposition theorem.

The main theorem of the paper states roughly that the Banach algebra of all bounded left-uniformly continuous functions on a topological group is the direct sum of a space of functions which in a sense vanish at infinity and a space of functions which 'oscillate regularly.' The first space is any proper self-adjoint closed ideal I maximal with respect to the property of being invariant under left translation. (Such ideals exist by Zorn's Lemma.) The second space is a self-adjoint closed algebra A containing the constants and invariant under left translation. The decomposition is not canonical, even if I is held fixed. But any A of the type described above that is a direct summand with some such I is a direct summand with every such I, and vice-versa. Each such algebra A contains all almost periodic functions and even the wider class of right distal functions, which are defined in 'Distal functions' by A. W. Knapp, Proc. of the Nat. Acad. Sci., vol. 52 (1964), pp. 1409-1412. (Author)
AD-646 842 Not available from CFSTI.

AN INITIAL-VALUE METHOD SUITABLE FOR THE COMPUTATION OF CERTAIN FREDHOLM RESOLVENTS,
RAND Corp., Santa Monica, Calif.
H. H. Kagiwada, and R. E. Kalaba. Jan 67, 24p
RM-5258-PR
Contract F44620-67-C-0045
See also AD-642 121.

Descriptors: (*Initial value problems, *Integral equations), (*Numerical methods and procedures, Integral equations), Differential equations, Integration, Functions.
Identifiers: Fredholm resolvent.

A new and effective method is provided for solving a certain class of Fredholm equations by digital computer. Here the resolvent of the Fredholm equation is characterized as the solution of an initial-value problem--a type of problem readily resolved by computer--and a numerical procedure is given that makes it possible to use the computer's ability to integrate large systems of ordinary differential equations with given initial conditions. Test calculations on a sample problem were completely successful. (Author)
AD-646 852 HC$3.00 MF$0.65

EQUILIBRIUM POINTS FOR GAMES WITH INFINITELY MANY PLAYERS.
Research memo.,
Hebrew Univ., Jerusalem (Israel). Dept. of Mathematics.
Bezalel Peleg. Dec 66, 9p RM-24
Contract N62558-4355
Report on Research Program in Game Theory and Mathematical Economics.

Descriptors: (*Game theory, Set theory), Functions, Probability, Measure theory, Israel.
Identifiers: Equilibrium points, N-person game.

Conditions that guarantee the existence of equilibrium points for games with infinitely many players are discussed; essentially what is needed is that the payoff functions are continuous in an appropriate sense. If the continuity assumption does not hold then one shows by an example that equilibrium points may not exist. (Author)
AD-646 901 HC$3.00 MF$0.65

ABSCISSAS AND WEIGHTS FOR GUASSIAN QUADRATURE FOR N = 2 TO 100, AND N = 125, 150, 175, 200.
National Bureau of Standards, Boulder, Colo. Inst. for Basic Standards.
Carl H. Love. 28 Dec 66, 92p
Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.55.

Descriptors: (*Integration, Tables), (*Approximation (Mathematics), Numerical analysis), Polynomials, Functions, Errors.
Identifiers: Gaussian quadrature, Quadrature formulae.

The abscissas and weights for Gaussian Quadrature of order N = 2 to 100, and N = 125, 150, 175, and 200 are given. The abscissas are given to twenty-four places and the error is estimated to be no more than 1 unit in the last place. The weights are given to twenty-three places and the error is estimated to be no more than 1 unit in the last place. (Author)
NBS-Mono-98 HC$0.55 MF$0.65

THE PHENOMENA THAT OCCUR IN THE NEIGHBORHOOD OF A TIME LINE.
Sopra I Fenomeni Che Avvengono In Vicinanza Di Una Linea Oraria
National Aeronautics and Space Administration, Washington, D. C.
E. Fermi. Oct 66, 11p NASA-TT-F-10356
Transl. Into English From Italian

Descriptors: *Geometry, *Relativistic theory, Coordinate, Differential equation, Electromagnetic, Euclidean space, Hypothesis, Line, Magnitude, Observation, Relativity, Riemann integral, Theory, Time.

For abstract, see STAR 05 06.
N67-15554 HC$3.00 MF$0.65

STABILITY OF SYSTEMS WITH DELAY.
National Aeronautics and Space Administration, Washington, D. C.
S. N. Shimanov. Dec 66, 16p NASA-TT-F-10488
Transl. Into English From Anal. Mekh., Ustoychivost' Dvizheniya, Nebesnaya Ballistika, Moscow, 1965 P 170-180 Presented At The 2d All-union Conf. On Theoret. And Appl. Mech., Moscow, 29 Jan. - 5 Feb. 1964

Descriptors: *Differential equation, *Liapunov function, *Linear system, *System stability, *Time delay, Approximation, Bibliography, Delay, Differential, Equation, Linear, Method, Motion, Periodic, Stability, System, Theory, Time.

For abstract, see STAR 05 06.
N67-15695 HC$3.00 MF$0.65

LYAPUNOV FUNCTIONS FOR A CLASS OF NTH ORDER NONLINEAR DIFFERENTIAL EQUATIONS.
Rochester Univ., N. Y.
C. S. Chen, and E. Kinnen. Jan 67, 31p NASA-CR-687
Grant NSG-574

Descriptors: *Differential equation, *Liapunov function, *Sequential analysis, Algebra, Analysis, Definition, Derivative, Development, Differential, Equation, Nonlinearity, Polynomial, Quadratic, Sequence, Sign, Variable.

For abstract, see STAR 05 06.
N67-16010 HC$3.00 MF$0.65

12B. OPERATIONS RESEARCH

JOSS: USER SCHEDULING AND RESOURCE ALLOCATION.
RAND Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 9B.
AD-646 395 HC$3.00 MF$0.65

SENSITIVITY ANALYSIS AND SYNTHESIS OF MULTIVARIABLE SYSTEMS.
Revised ed.,
Frank J. Seiler Research Lab., United States Air Force Academy, Colo.
Bernard S. Morgan, Jr. 11 Apr 66, 12p SRL-66-0004
Revision of manuscript submitted 10 Dec 65. Presented at Annual Allerton Conference on System and Circuit Theory (3rd), Monticello, Ill., 1965.
Availability: Published in IEEE Transactions on Automatic Control vAC-11 n3 p506-12 Jul 1966.

Descriptors: (*Control systems, Multiple operation), Systems engineering, Input-output devices, Sensitivity, Synthesis, Transfer functions, Matrix algebra, Algorithms, Differential equations, Mathematical models.

The paper consists of two main parts. The first part considers the sensitivity analysis of a linear time-invariant multivariable (multiple input-output) system represented by a system of first-order differential equation. Procedures which can be easily programmed on a digital computer are presented for the determination of: (1) the system transfer-function matrix; (2) sensitivity coefficients for the transfer-function matrix in terms of the system parameters. The second part contains a simple procedure for the synthesis of a linear single-variable (single input-output) system for specified characteristic roots. This is also shown to be a general procedure for the reduction of a system to (phase-variable) canonical form. The procedures of Part I and Part II are then applied to the synthesis of a single-variable system for insensitivity to parameter changes. (Author)
AD-646 401 Not available from CFSTI.

THE STATUS OF MATHEMATICAL INVENTORY THEORY.
Technical rept.,
Stanford Univ., Calif. Dept. of Industrial Engineering.
Arthur F. Veinott, Jr. Jul 65, 36p TR-7
Contract Nonr-225 (77)
Presented at Logistics Research Conference, Warrenton, Va., May 1965.
Availability: Published in Management Science v12 n11 p745-77 Jul 1966.

Descriptors: (*Reviews, *Inventory analysis), (*Optimization, Inventory), Inventory control, Dynamic programming, Model theory, Costs, Uncertainty.

The paper surveys the current status of mathematical inventory theory. The review is limited to studies which seek optimal policies for dynamic inventory models. Models with certain and uncertain demands are discussed. Particular attention is focused on multi-item and/or multi-echelon inventory systems. (Author)
AD-646 403 Not available from CFSTI.

AN ABSTRACT VARIATIONAL THEORY WITH APPLICATIONS TO A BROAD CLASS OF OPTIMIZATION PROBLEMS. I. GENERAL THEORY,
University of Southern California, Los Angeles. Dept. of Electrical Engineering.
Lucien W. Neustadt. 23 Feb 66, 25p
AFOSR-67-0046
Grants AF-AFOSR-496-66, AF-AFOSR-1029-66
Availability: Published in J. Siam Control v4 n3 p505-27 1966.

Descriptors: (*Calculus of variations, Theory), (*Optimization, Calculus of variations), Topology, Convex sets, Real numbers, Mathematical programming, Complex variables, Control.

The article formulates a very general variational problem and derives necessary conditions which solutions of this problem must satisfy. The variational problem is formulated in the setting of a locally convex linear topological space. The basic concepts in this formulation are those of an internal cone, a first-order convex approximation, and a particular type of differential. The necessary conditions satisfied by solutions of the general variational problem are in the form of a separation theorem for two convex sets. It is shown how this work relates to that of Pontryagin and to Gamkrelidze. (Author)
AD-646 415 Not available from CFSTI.

GENERAL NECESSARY CONDITIONS FOR OPTIMIZATION PROBLEMS.
Interim rept.,
University of Southern California, Los Angeles. Dept. of Electrical Engineering.
Hubert Halkin, and Lucien W. Neustadt. 3 Aug 66, 9p
AFOSR-67-0145
Grant AF-AFOSR-1029-66
Prepared in cooperation with California Univ., San Diego, La Jolla. Dept. of Mathematics., Grant AF-AFOSR-1039-66.
Availability: Published in Proceedings of the National Academy of Sciences v56 n4 p1066-71 Oct 1966.

Descriptors: (*Optimization, *Mathematical programming), Set theory, Functional analysis, Real numbers, Topology, Convex sets.
Identifiers: Maximum principle.

A very general maximum principle for a mathematical programming problem over an arbitrary set is derived for optimization problems. Although the nonlinear optimal control problem was the motivation, the results of this paper include the Standard Kuhn-Tucker necessary conditions and generalize then from finite dimensional spaces to arbitrary linear spaces. The paper includes and extends all the important necessary conditions in optimal control (with or without restricted phase coordinates). (Author)
AD-646 417 Not available from CFSTI.

ALL SHORTEST ROUTES IN A GRAPH.
Technical rept.,
Stanford Univ., Calif. Operations Research House.
George B. Dantzig. Nov 66, 8p TR-66-3
Contracts N00014-67-A-0112-0011, AT (04-3)-326
Research supported in part by NSF, Grant C-P-6431. See also AD-646 552.

Descriptors: (*Graphics, *Linear programming), Mathematical logic, Operations research, Optimization.
Identifiers: Shortest-route problem, Traveling salesman problem.

An inductive procedure on nodes is given that requires n (n-1) (n-2) comparison - addition operations to determine minimum routes between all nodes of a directed network. Arc distances may be negative. If negative cycles exist, however, termination will occur when one such is found. (Author)
AD-646 551 HC$3.00 MF$0.65

ALL SHORTEST ROUTES FROM A FIXED ORIGIN IN A GRAPH.
Technical rept.,
Stanford Univ., Calif. Operations Research House.
George B. Dantzig, W. O. Blattner, and M. R. Rao. Nov 66, 14p TR-66-2
Contracts N00014-67-A-0112-0011, AT (04-3)-326
See also AD-646 551.

Descriptors: (*Graphics, *Linear programming), Mathematical logic, Operations research, Optimization.
Identifiers: Shortest-route problem, Traveling salesman problem.

A shortest route is sought between a fixed origin to other nodes in a graph when directed arc distances are given which may be positive, negative, or zero. This problem as stated includes the difficult travelling salesman problem. A less difficult problem is considered instead, namely: To find a negative cycle in a graph if one exists or if none exists then to find all the shortest paths from the origin. The method is inductive on nodes. (Author)
AD-646 552 HC$3.00 MF$0.65

FINDING A CYCLE IN A GRAPH WITH MINIMUM COST TO TIME RATIO WITH APPLICATION TO A SHIP ROUTING PROBLEM.
Technical rept.,
Stanford Univ., Calif. Operations Research House.
George B. Dantzig, W. O. Blattner, and M. R. Rao. Nov 66, 16p TR-66-1
Contracts N00014-67-A-0112-0011, AT (04-3)-326

Descriptors: (*Shipping (Marine), Optimization), (*Graphics, *Linear programming), Costs, Algorithms, Mathematical logic, Simplex method, Operations research.
Identifiers: Shortest-route problem, Decomposition principle, Traveling salesman problem.

Associated with each arc of a directed graph are two numbers which will be called arc cost and arc time. The problem is to find that cycle in a graph whose ratio of the sum of arc costs to the sum of arc times around the cycle is a minimum. Application of the simplex method reduces to finding a negative cycle in a graph when arc distances are given which may be positive or negative. The algorithm thus may be viewed as a variant of the shortest route algorithm that yields either the shortest route from a starting node tolo all others or uncovers a negative cycle. This problem arose as a sub-problem of a larger problem in which the decomposition principle was used. The application was to ship routing where there are quantities to be shipped between various parts, and vessels have capacities that depend on the type of vessel and type of arc. (Author)
AD-646 553 HC$3.00 MF$0.65

QUANTUM THEORY OF MEASUREMENT IN RELATION TO A GENERAL THEORY OF OBSERVATION AND CONTROL.
Boston Univ., Mass. Dept. of Physics.
For primary bibliographic entry see Field 20J.
AD-646 571 HC$3.00 MF$0.65

THE USE OF STATISTICAL COMMUNICATION THEORY FOR CHARACTERIZATION OF POROUS MEDIA.
Master's thesis,
Kansas Univ., Lawrence. Dept. of Chemical and Petroleum Engineering.
William D. Aldenderfer, Floyd W. Preston, and Don W. Green. 1966, 21p
Availability: Published in Computers and Operation Research in Mineral Industries, Pennsylvania State Univ., Annual Symposium (6th) 20p 1966.

Descriptors: (*Mathematical models, *Porous materials), Information theory, Harmonic analysis, Power spectra, Porosity, Statistical functions, Rock (Geology), Petrology.

Power spectra for four different porous media are shown. For these synthetic bead packs duplicate runs were made, using a different placement of the grid overlay on the photograph. It can be seen that there is a general stability of the spectra for each porous medium. Thus, each porous medium seems to be characterized by its own power spectrum nearly constant for repeat tests on the same medium and different media. Also, the three glass bead packs have spectra different from that studied by Fara and Scheidegger. A brief study was made to compare the power spectra computed by the Tukey-Hanning method and by classical harmonic analysis. This is essentially the method of the Schuster periodogram. The comparison with the Tukey-Hanning estimate of the power spectrum is given. Hannan has shown that the Schuster periodogram method yields an estimate of the power spectrum of a stationary random function but not a good one because the variance of the estimated spectrum does not approach zero as the sample size approaches infinity. This however, applies to the raw or unsmoothed spectrum. It is interesting to note the renewed interest in the periodogram approach shown very recently by Jones who states that with the right smoothing function and for some systems better estimates of power spectra can be obtained with the periodogram approach.
AD-646 695 Not available from CFSTI.

A CHANCE-CONSTRAINED APPROACH TO CAPITAL BUDGETING WITH PORTFOLIO TYPE PAYBACK AND LIQUIDITY CONSTRAINTS AND HORIZON POSTURE CONTROLS.
Carnegie Inst. of Tech., Pittsburgh, Pa. Management Sciences Research Group.
For primary bibliographic entry see Field 5C.
AD-646 723 HC$3.00 MF$0.65

UPPER AND LOWER BOUNDS FOR SOLUTIONS TO THE TRANSPORT EQUATION.
Revised ed.,
Minnesota Univ., Minneapolis.
Bruce A. Finlayson, and L. E. Scriven. 9 May 66, 8p
AFOSR-67-0320
Grant AF-AFOSR-219-63
Revision of manuscript submitted 26 Jan 66.
Availability: Published in A.I.Ch.E. Journal v12 n6 p1151-7 Nov 1966.

Descriptors: (*Optimization, *Transport properties), (*Integral equations, *Approximation (Mathematics)), Initial value problems, Linear programming, Heat transfer, Mass transfer.

The collocation method and a maximum principle are used to generate pointwise, improvable upper and lower bounds for solutions of the transport equation. This new method of analysis is applicable to the unsteady state transport equation with a specified velocity field as well as to other problems which have a maximum principle. An application to unsteady state transfer to a fluid in ideal stagnation flow illustrates the method. (Author)
AD-646 801 Not available from CFSTI.

SIMPLIFIED CONDITIONS FOR CONTROLLABILITY AND OBSERVABILITY OF LINEAR TIME-INVARIANT SYSTEMS,
California Univ., Berkeley. Dept. of Electrical Engineering.
C. T. Chen, C. A. Desoer, A. Niederlinski, and R. E. Kalman. 23 Feb 66, 3p
AFOSR-67-0340
Grants AF-AFOSR-139-65, NSF-GK-569
Prepared in cooperation with Politechnika Slaska Gliwice (Poland) and Stanford Univ., Calif.
Availability: Published in IEEE Transactions on Automatic Control vAC11 n3 p613-4 Jul 1966.

Descriptors: (*Control, Linear systems), (*Differential equations, Control), Matrix algebra, Inequalities, Polynomials.
Identifiers: Time-invariant systems.

The paper simplifies the well known necessary and sufficient conditions for observability and controllability of linear time-invariant differential system. (Author)
AD-646 831 Not available from CFSTI.

ELASTIC PLASTIC TORSION AS A PROBLEM IN NON-LINEAR PROGRAMMING,
Illinois Inst. of Tech., Chicago. Dept. of Mechanics.
For primary bibliographic entry see Field 20K.
AD-646 888 HC$3.00 MF$0.65

LP II: A GOAL PROGRAMMING MODEL FOR MEDIA PLANNING.
Carnegie Inst. of Tech., Pittsburgh, Pa. Management Sciences Research Group.
For primary bibliographic entry see Field 5A.
AD-646 918 HC$3.00 MF$0.65

A GENERALIZATION OF THE MOTZKIN THEOREM,
Parke Mathematical Labs., Inc., Carlisle, Mass.
Lorenzo Calabi, and William E. Harnett. Nov 66, 32p Scientific-2
AFCRL-66-824
Contract AF 19 (628)-5711
See also AD-631 279.

Descriptors: (*Theorems, *Pattern recognition), (*Mathematical models, *Visual perception), Convex sets, Convex bodies, Topology, Mapping (Transformations).
Identifiers: Motkin's theorem.

A figure A in the Euclidean plane is a compact set whose closed convex hull C (A) has a non empty interior; a ball of support for A is a closed ball which has points of A on the boundary but not in the interior. For each figure A, let C (A)-A denote the convex deficiency of A and let (S,q) denote the skeletal pair of A where S is the set of centers of maximal balls of support for A and q (x) is the distance from x to A for xeS. The following statements are proved: (1) Two figures have equal convex deficiencies if they have equal skeletal pairs. (2) (Motzkin's Theorem) A figure is convex if its skeleton is empty. (3) A figure is uniquely determined by its closed convex hull and its skeletal pair. (4) A figure with empty interior is uniquely determined by its skeletal pair. (Author)
AD-646 926 HC$3.00 MF$0.65

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING.

13B. CIVIL ENGINEERING

ENGINEERING CLASSIFICATION AND INDEX PROPERTIES FOR INTACT ROCK.
Illinois Univ., Urban. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8G.
AD-646 610 HC$3.00 MF$0.65

ANALYSIS OF STRESS DISTRIBUTION BENEATH EMBANKMENTS.
Massachusetts Inst. of Tech., Cambridge. Soil Mechanics Div.
For primary bibliographic entry see Field 8M.
PB-173 637 HC$3.00 MF$0.65

ANALYSIS OF DISSOLVED OXYGEN IN NATURAL AND WASTE WATERS,
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
Khalil H. Mancy, and Theodore Jaffe. Apr 66, 98p
PHS-Pub-999-WP-37
Grant PHS-WP-00566

Descriptors: (*Water supplies, Chemical analysis), (*Oxygen, Water supplies), Solubility, Water pollution, Wastes (Industrial), Wastes (Sanitary engineering), Public health.

A comprehensive discussion of the various methods of analysis for dissolved oxygen in natural and waste waters is presented. Special emphasis is given to pointing out the applicability and limitations of each method. Several titrimetric methods and micro techniques are described. Manometric, gas-exchange, gas chromatographic, radiometric, and polarographic techniques and galvanic and membrane electrodes are among the instrumental methods discussed. In situ measurements of the activity of molecular oxygen are claimed to be more significant than concentration measurements. Examples of laboratory and field studies are given.
PB-173 983 HC$3.00 MF$0.65

THE ROLE OF BOTTOM-DWELLING MACROFAUNA IN WATER POLLUTION INVESTIGATIONS,
Public Health Service, Cincinnati, Ohio. Div. of Water Supply and Pollution Control.
Lowell E. Keup, William M. Ingram, and Kenneth M. Mackenthun. 1966. 28p PHS-Pub-999-WP-38

Descriptors: (*Water pollution, Aquatic animals), (*Marine biology, Water pollution), Water supplies, Wastes (Industrial), Wastes (Sanitary engineering), Environment, Sensitivity, Ecology, Tolerances (Physiology).

The authors evaluate the use of bottom-dwelling animals in water pollution abatement programs. How and why the bottom-dwelling fauna exhibit pollution-induced changes and the factors involved in data collection, interpretation, and evaluation are discussed. A bibliography on the theory and applied use of bottom-dwelling animals in pollution evaluation is included.
PB-173 985 HC$3.00 MF$0.65

HIGHWAY RESEARCH AND DEVELOPMENT STUDIES USING FEDERAL-AID RESEARCH AND PLANNING FUNDS, FISCAL YEAR 1967 OR CALENDAR YEAR 1966, IN PROGRESS AS OF JULY 1, 1966.
Bureau of Public Roads, Washington, D. C.
For primary bibliographic entry see Field 5A.
PB-173 988 HC$1.00 MF$0.65

PLAN TO DEVELOP TECHNOLOGY FOR INCREASING WATER YIELD FROM ATMOSPHERIC SOURCES.
Bureau of Reclamation, Washington, D. C. Office of Atmospheric Water Resources.
Nov 66, 64p
Report on an Atmospheric Water Resources Program.

Descriptors: (*Water supplies, Atmospheric precipitation), (*Research program administration, Natural resources), Urban areas, Population, Weather.

Contents: The national water resources picture; How weather modification can change the water resources picture; Existing Department of the Interior program; Outline of the program plan; Management and organizational arrangements. (Author)
PB-173 994 HC$3.00 MF$0.65

DEFORMATION CHARACTERISTICS OF GRANULAR MATERIALS SUBJECTED TO RAPID, REPETITIVE LOADING.
Research rept.,
Texas Transportation Inst., College Station.
Wayne A. Dunlap. Nov 66, 222p RR-27-4, 0543
Report on project Distribution of Stress in Layered Systems Composed of Granular Materials. Prepared in cooperation with Texas Highway Dept., and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Construction materials), (*Construction materials, Deformation), Loading (Mechanics), Impact tests, Stresses, Fatigue (Mechanics), Texas, Gravel, Strain (Mechanics), Density.

The report presents the results of a study of the behavior of certain granular materials under repetitive triaxial stressing. Collaterally, the report also presents (1) the results of a literature search of research on stress repetition-deformation relationships of roadway materials and (2) a general review of the principles of material fatigue. The repetitive load tests indicated that (1) on the basis of total strain, the angular material, which was best according to static triaxial tests, suffered the greatest loss in performance, (2) on the basis of rebound strain, the rounded material showed the best performance and (3) only the soft material showed significant degradation. The author concludes that the most important facts gained from the study were: (1) The results of repetitive triaxial tests can be expressed quantitatively. (2) The density of a granular material may have a greater influence on repetitive loading behavior than either particle shape or particle hardness. (BPR abstract)
PB-174 005 HC$3.00 MF$0.65

THE EXPLORATION OF ECONOMIC, SAFETY, MAINTENANCE AND/OR OPERATIONS ON PAVED VERSUS UNPAVED SHOULDERS.
Final rept.,
North Carolina State Univ., Raleigh. Dept. of Engineering Research.
Clinton L. Heimbuch, and Harold D. Vick. Jun 66, 78p Rept. no. 0583
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, *Civil engineering), Economics, Safety, Maintenance, Pavements, Foundations (Structures), Design, Performance (Engineering).

The report presents informative summaries of pertinent references used in exploring what has been done in the past concerning the economy, maintenance, safety, and operational aspects of paved versus unpaved shoulders and of current practices and costs of shoulders in North Carolina and other States. Limitations of maintenance cost data currently available in North Carolina is reviewed along with suggestions for future needs if shoulder studies are to be made. Eight plans for possible research are described and embellished with pertinent evaluations. Recognition is given to the benefits derived from paved shoulders but the shoulder problem must be studied concomitantly with all other roadway and traffic characteristics to determine their effects and interrelationships. (Author)
PB-174 008 HC$3.00 MF$0.65

AUTOMATIC 'ICY ROAD' SIGN STUDY.
Final rept.
Colorado State Dept. of Highways, Planning and Research Div.
Aug 66, 24p Rept. no. 0612
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Safety), (*Visual signals, Roads), Automatic, Ice, Hazards, Sensors, Moisture, Atmospheric temperature, Humidity.
Identifiers: Highway signs.

When a bridge deck surface becomes icy, it presents hazard to a motorist. In some states he is warned of the impending a serious danger by signs which are put out and taken in as needed. However, they require someone to do this operation manually. This report summarizes the result of tests to evaluate the ability of a control device to detect, and automatically indicate when such an icy condition exists. The icy condition is determined by electronic sensors which are installed in the pavement and detect when both the temperature of the pavement is less than 30F and a film of water exists. Only when these two conditions exist are the icy road warning signs automatically turned on. The operation of the signs were evaluated by analyzing their operational records. Also, continuous recordings of air temperature and relative humidity were taken simultaneously. An important conclusion of the study is that the proper installation location and adjustment of the temperature and moisture sensors is critical. (Author)
PB-174 010 HC$3.00 MF$0.65

A STUDY TO DEVELOP METHODS FOR IMPROVING THE TRAINING OF CONSTRUCTION AND MATERIALS INSPECTORS.
Final rept.,
Mississippi State Highway Dept.
B. F. Wallace. 31 Aug 66, 52p Rept no. 0697-1
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. See also PB-174 014.

Descriptors: (*Training, Teaching methods), (*Roads, Quality control), Construction, Construction materials, Mississippi, Instruction manuals.
Identifiers: Inspectors.

The report and training manual provide a comprehensive tool for training and developing construction and materials inspectors. The report was quite brief but was supplemented by the comprehensive training manual. Recommendations were contained in the report text. The training manual included sections on surface geology, soils and soil testing, compaction, earthwork, subbases and bases, concrete pavement, structures and bituminous pavements. (BPR abstract)
PB-174 013 HC$3.00 MF$0.65

TRAINING MANUAL FOR INSPECTORS AND TECHNICIANS.
Mississippi State Highway Dept.
Mar 65, 402p Rept. no. 0697-2
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Instruction manuals, *Roads), Technicians, Construction, Construction materials, Mississippi, Training, Geology, Soils, Concrete, Pavements, Structures, Asphalt.
Identifiers: Inspectors.

Contents: Surface geology of Mississippi, by C. V. Clark; Soils and soils testing, by J. P. Fulton; Development of the soil profile, by L. G. Summerford; Earthwork, by R. W. Thomas; Subbases and bases (Lime stabilization), by W. N. McDonald, Jr.; Concrete pavement (Notes on Portland cement concrete, by J. K. Toland; Portland cement concrete pavement), by W. W. Elliott, Jr.; Structures (Notes on inspection of structures), by T. H. McElroy, Jr., R. D. Ramsey, and W. M. Wiborn; Bituminous pavements, by H. E. Smith and W. E. York.
PB-174 014 HC$3.00 MF$0.65

EFFECT OF TEMPERATURE AT THE TIME OF MIXING ON ASPHALTIC CONCRETE, VOLUME I.

Final rept., 22 Nov 61-22 May 66,
West Virginia Univ., Morgantown. Engineering Experiment Station.
James H. Schaub, and A. F. Galli. 1966, 215p
Rept. no. 0731-1
See also PB-174 017. Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Construction), (*Construction materials, Roads), Asphalt, Concrete, Cements, Mixtures, Viscosity, Temperature, Bituminous coatings, Limestone, Density, Stability, Pavements, Traffic.

The purpose of this study was to investigate, by laboratory and field procedures, the effect that the viscosity of asphalt at the time of mixing and compaction has on the physical properties of bituminous concrete mixtures. In the laboratory phase of the study four asphalts incorporated with three aggregate blends were mixed and compacted at various temperatures. Molded specimens were prepared using the Gyratory Testing Machine and evaluated for Hveem stability, cohesiometer value, air voids and density. The authors conclude that (1) the viscosity of the asphalt at the time of mixing does not contribute appreciably to variation in density, Hveem stability, cohesion or air void values, (2) the viscosity of the asphalt at the time of compaction does not influence density and air voids but does influence Hveem stability and cohesion values and (3) specimens molded on base plates at 32F show no change in density or air void values with changes in viscosity of the asphalt was increased at the time of compaction.
PB-174 016 HC$3.00 MF$0.65

EFFECT OF TEMPERATURE AT THE TIME OF MIXING ON ASPHALTIC CONCRETE, VOLUME II.
Final rept.,
West Virginia Univ., Morgantown. Engineering Experiment Station.
James H. Schaub, and A. F. Galli. 1966, 176p
Rept. no. 0731-2
See also PB-174 016. Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Construction), (*Construction materials, Roads), Asphalt, Concrete, Cements, Mixtures, Temperature, Density, Bituminous coatings, Pavements, Viscosity, Cooling, Traffic, Stability.

In one field study the mixing and compaction temperature was varied to determine the effect such changes have on the engineering properties of bituminous mixtures. Density, Hveem stability, cohesion and air void values were determined on pavement samples taken after construction and 9 months later. It was found that immediately after construction stability and cohesion values were dependent on compaction temperature and density was dependent upon the number of roller passes. After 9 months service higher densities and low cohesion values were attained in sections compacted at higher temperatures but no correlation was found with stability values. For the conditions encountered during construction it was found that the base temperature has more influence on the temperature of the paving mixture than did the temperature of the air. The authors make the following recommendations based on the results of their research findings: (1) the asphaltic concrete mixture used in the field study should be mixed and compacted in the temperature range of 280F-300F, (2) the viscosity of the asphalt at the time of compaction should not be more than 1000 Saybolt Furol seconds, and (3) the control of paving conditions should be based on the temperature of the surface of the base rather than on the temperature of the air - a tentative value of 45F is suggested.
PB-174 017 HC$3.00 MF$0.65

EDDINGTON EXPERIMENTAL PROJECT, EDDINGTON, MAINE.
Maine State Highway Commission. Soils Div.
For primary bibliographic entry see Field 8M.
PB-174 018 HC$3.00 MF$0.65

NEED AND JUSTIFICATION FOR ELECTRICAL CONDUIT ON URBAN FREEWAYS,
National Proving Ground for Freeway Surveillance, Control and Electronic Traffic Aids, Detroit, Mich.
Edward F. Gervais, and Herbert L. Crane. Sep 66, 18p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Ducts), (*Ducts, Electric cables), Construction, Costs, Installation, Urban areas, Design.
Identifiers: Freeways.

The report is an outline of the comparative advantages and disadvantages of installing such a system of ducts on initial construction of the freeway as compared with installing them on a separate contract after the roadway is open to traffic. An initial determination must be made on the merits of running the duct under or near the service drive as opposed to running it back of the freeway shoulder. (Author)
PB-174 020 HC$3.00 MF$0.65

TRANSIMVILLE: APPLICATION OF TRANSIM TO ANALYSIS OF THE EFFECTS OF MUNICIPAL REGULATIONS ON MOTOR CARRIER OPERATIONS.
California Univ., Los Angeles. Dept. of Engineering.
For primary bibliographic entry see Field 13F.
PB-174 021 HC$3.00 MF$0.65

13C. CONSTRUCTION EQUIPMENT, MATERIALS, AND SUPPLIES

PROTECTIVE STRUCTURES AND COMPONENTS: COMPILATION OF ABSTRACTS.
Library of Congress, Washington, D. C. Aerospace Technology Div.
For primary bibliographic entry see Field 5A.
AD-646 390 HC$3.00 MF$0.65

EFFECT OF WIND ON CREEP AND DRYING SHRINKAGE OF HARDENED CEMENT MORTAR AND CONCRETE,
Stanford Univ., Calif. Dept. of Civil Engineering.
Torben C. Hansen. 1966, 5p
Availability: Published in Materials Research and Standards v6 n1 p16-9 Jan 1966.

Descriptors: (*Concrete, Moisture), (*Cements, Moisture), Wind, Velocity, Creep, Drying, Shrinkage, Construction materials, Hardening, Joining.

The data show that there is little difference in weight change, shrinkage, and creep of cement mortar specimens exposed to wind, and specimens stored in calm air. The tests were made on small specimens having a large ratio of exposed surface to volume, so that any effect of differences in drying should be more pronounced than it would be in structural concrete members. Therefore it may be concluded that the effect of wind velocity on the creep and drying shrinkage of structural concrete members is insignificant.
AD-646 469 Not available from CFSTI.

DEVELOPMENT OF METHODS OF TESTING AGGREGATE LARGER THAN 1-1/2 INCH.
Technical rept.,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
R. L. Curry, and A. D. Buck. Dec 66, 114p
AEWES-TR-6-747
Availability: Hard copy available from Army Engineer Waterways Exp. Sta. Vicksburg, Miss., $1.00.

Descriptors: (*Contruction materials, Test methods), Concrete, Limestone, Particle size, Performance (Engineering), Tests.
Identifiers: Aggregate (Materials).

The investigation involved the study of concrete aggregate from seven different sources. The tests included petrographic analysis, sieve analysis, specific gravity, absorption, soft particles, Los Angeles abrasion, flat and elongated particles, magnesium sulfate soundness, and freezing and thawing in concrete. The objective of the study was to evaluate existing and new test methods and to determine if existing test methods for aggregates smaller than a 1-1/2-in. sieve. provide accurate data for use in evaluating aggregate larger than a 1-1/2-in. sieve. It was concluded from the physical tests that when the aggregates of larger than 1-1/2-in. size are crushed and then tested, the results give a better indication of actual behavior of the aggregates in concrete than do the results of similar tests of larger than 1-1/2-in. size material. It was concluded from the petrographic analyses that (1) for bedded rock, the maximum size of aggregate produced from a source should never be greater than the bedding thickness, (2) for material larger than 1-1/2-in., aggregate produced from bedded materials should be used in concrete before destructive weathering occurs or else it should be rescreened before using, and (3) chemical reactivity of the aggregate is more likely to be a problem with gravel aggregate than is particle size reduction during stockpile storage. (Author)
AD-646 502 MF$0.65

DEFORMATION CHARACTERISTICS OF GRANULAR MATERIALS SUBJECTED TO RAPID, REPETITIVE LOADING.
Texas Transportation Inst., College Station.
For primary bibliographic entry see Field 13B.
PB-174 005 HC$3.00 MF$0.65

A STUDY TO DEVELOP METHODS FOR IMPROVING THE TRAINING OF CONSTRUCTION AND MATERIALS INSPECTORS.
Mississippi State Highway Dept.
For primary bibliographic entry see Field 13B.
PB-174 013 HC$3.00 MF$0.65

TRAINING MANUAL FOR INSPECTORS AND TECHNICIANS.
Mississippi State Highway Dept.
For primary bibliographic entry see Field 13B.
PB-174 014 HC$3.00 MF$0.65

13D. CONTAINERS AND PACKAGING

PROTECTIVE STRUCTURES AND COMPONENTS: COMPILATION OF ABSTRACTS.
Library of Congress, Washington, D. C. Aerospace Technology Div.
For primary bibliographic entry see Field 5A.
AD-646 390 HC$3.00 MF$0.65

13F. GROUND TRANSPORTATION EQUIPMENT

TRAFFICABILITY TESTS WITH THE 5-TON GOER (XM520) ON FINE-AND COARSE-GRAINED SOILS.

Rept. for 18 Jan-23 Feb 61,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
E. S. Rush. Apr 62, 31p Miscellaneous Paper-4-477

Descriptors: (*Cargo vehicles, Trafficability), Soils, Tests, Tires, Performance (Engineering).
Identifiers: M-520 Trucks (5-ton).

Tests were conducted in soft, fine-grained soils and clean sand to determine performance characteristics of the 5-ton GOER for two tire sizes. In fine-grained soils the GOER performed better with 18.00-26 tires than with 15.00-34 tires. With 18.00-26 tires it performed better than standard military 6x6 wheeled vehicles of 2-1/2- and 5-ton capacity. In sand the GOER also performed better with 18.00-26 tires than with 15.00-34 tires. In one specific clean sand its performance with either size tire was better than any wheeled vehicle tested to date by WES. Additional testing, particularly in snow, sand, and muskeg, is needed to evaluate the vehicle fully. The computations for determining the vehicle cone index of the GOER for operation in fine-grained soils are included. (Author)
AD-646 591 HC$3.00 MF$0.65

HUMAN FACTORS ENGINEERING DESIGN STANDARD FOR WHEELED VEHICLES,
Human Engineering Labs., Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 5E.
AD-646 681 HC$3.00 MF$0.65

PARTIAL BIBLIOGRAPHY ON SUBJECTS RELATED TO ACTIVE VIBRATION ISOLATION AND ACTIVE VEHICLE SUSPENSIONS,
Massachusetts Inst. of Tech., Cambridge. Engineering Projects Lab.
Igor L. Paul, and Erich K. Bender. 1 Nov 66, 35p
DSR-76109-2
Contract C-85-65

Descriptors: (*Vibration, Bibliographies), (*Suspension devices, Bibliographies), Vehicles, Subject indexing, Mathematical analysis.

The report represents a partial compilation of references on subjects related to active vibration isolation and active vehicle suspensions which have been collected during the past year in connection with active vehicle suspension research. The bibliography is categorized into a number of subject headings which reveal the diversity and scope of published work in the general area of vibration isolation, ranging from purely mathematical techniques for optimum vibration filter calculations to the most practical aspects of suspension hardware design. No attempt has been made to sort or classify the reference with respect to the quality, scope, or usefulness of their contents. (Author)
PB-173 649 HC$3.00 MF$0.65

TRANSIMVILLE: APPLICATION OF TRANSIM TO ANALYSIS OF THE EFFECTS OF MUNICIPAL REGULATIONS ON MOTOR CARRIER OPERATIONS.
California Univ., Los Angeles. Dept. of Engineering.
Jan 67, 154p
Contract CC-6220
Report on Project Transim. See also PB-168 437, PB-173 016.

Descriptors: (*Transportation, *Law), (*Traffic, Urban areas), Cargo vehicles, Operation, Costs, Systems engineering, Simulators, Digital computers, Commerce, Simulation.
Identifiers: Transim project.

The results indicate the following: (1) Restrictions on truck movements on certain streets results in increased carrier costs for urban operations. (2) Restrictions on truck movements during certain hours results in slightly lower carrier costs. (3) Restricting the use of line haul vehicles in the central business district results in major increases in carrier costs due to additional terminal handling of freight. (4) Restrictions on terminal locations result in significantly increased carrier costs due to increased running times, when the distances are increased between terminal location on one hand, and on the other, delivery zone and access highway. (5) Restrictions requiring consolidated terminal operations result in measurable savings to the carriers due to more efficient utilization of terminal physical plant, equipment, and manpower. (6) Consolidated pickup and delivery operations result in significantly increased costs for TL shipments and decreased costs for LTL shipments. (7) Restrictions on loading and unloading at the delivery and pickup stops result in increased carrier costs due to increased freight handling time. (Author)
PB-174 021 HC$3.00 MF$0.65

PROJECT TUBEFLIGHT. PHASE I. FEASIBILITY STUDY.
Final rept., 10 Dec 65-9 Sep 66.
Rensselaer Polytechnic Inst., Troy, N. Y.
Sep 66, 194p
Contract C-117-66
High speed ground transportation project.

Descriptors: (*Transportation, Feasibility studies), (*Passenger vehicles, Feasibility studies), Aerodynamics, Airfoils, Propulsion, Thrust, Pipes, Fans, Power supplies, High frequency, Electric propulsion, Stability, Control, Automatic, Model tests.
Identifiers: Tubeflight project.

Project Tubeflight is a study of a transportation mode in which aerodynamically supported and propelled vehicles travel at high speed in non-evacuated tubes. The feasibility of a mode of propulsion is studied in which thrust is generated by a continuous transfer of air in the tube from immediately in front of the vehicle to its rear. The use of bladeless fans as thrust generators for propulsion is examined. A study is made of the feasibility of powering the vehicle by high frequency electrical energy. The problem of radiating, propagating through the tube, receiving and rectifying this energy are covered. The inherent stability of a vehicle supported by a ram wing or a jet-flapped wing operating in close proximity to the tube wall is studied. A theoretical analysis of augmented stability and control is made, particularly in relation to the vehicle's roll. A small scale test facility was constructed consisting of an instrumented 12 inch diameter tube 2000 feet long. (Author)
PB-174 085 HC$3.00 MF$0.65

13G. HYDRAULIC AND PNEUMATIC EQUIPMENT

ELEMENTS AND DRIVES OF POWER FOLLOW-UP SYSTEMS: COLLECTION OF ARTICLES.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 13I.
AD-646 932 HC$3.00 MF$0.65

SYSTEMS AND CONTROLS LABORATORY RESEARCH REPORT.
Pennsylvania State Univ., University Park. Coll. of Engineering.
For primary bibliographic entry see Field 9C.
For abstract, see STAR 05 06.
N67-16061 HC$3.00 MF$0.65

13H. INDUSTRIAL PROCESSES

MOLYBDENUM SHEET ROLLING PROGRAM.
Universal-Cyclops Steel Corp., Bridgeville, Pa.
For primary bibliographic entry see Field 11F.
AD-458 529 HC$3.00

A DEVICE FOR INDUCTION ANNEALING OF AN ALUMINUM WIRE OR FILAMENT DURING DRAWING OR TWISTING,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
V. E. Gorbunov, V. Ya. Alekhin, and A. A. Lazarev
7 Nov 66, 5p FTD-HT-66-662
Ustroystvo dlya Induktsionnogo Otzhiga Aluminievoi Provoloki ili Zhily v Protsesse Volocheniya, unedited rough draft trans. of Patent (USSR) 158 916, appl. 794700/22-2, 22 Nov 1p 1963.

Descriptors: (*Annealing, *Aluminum), (*Industrial equipment, Annealing), Induction heating, Drawing (Machine processing), USSR, Wire, Hardening.

A device is described for the induction annealing of aluminum wire or filaments during drawing or twisting which includes a toroidal transformer and guiding rollers. To reduce extration during the annealing process two multigroove drive drums on which several loops of wire or filament are located before the annealing branch and after it. (Author)
AD-646 379 HC$3.00 MF$0.65

PROTECTION OF TITANIUM ALLOYS AGAINST HIGH TEMPERATURE GASEOUS CORROSION,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 11F.
AD-646 424 HC$3.00 MF$0.65

ANNUAL WIRE AND CABLE SYMPOSIUM (15th), 7, 8, AND 9 DECEMBER 1966, SHELBURNE HOTEL, ATLANTIC CITY, NEW JERSEY.
Army Electronics Command, Fort Monmouth, N. J.
For primary bibliographic entry see Field 9A.
AD-646 523 HC$3.00 MF$0.65

NEW DEVELOPMENTS IN CLAD METAL WIRE AND SHIELDING,
Texas Instruments, Inc., Attleboro, Mass. Materials Div.
For primary bibliographic entry see Field 9A.
AD-646 525 HC$3.00 MF$0.65

MEASURING PERFORMANCE OF AN EIGHT-INCH CABLE SHEATHING EXTRUDER,
Western Electric Co., Inc., Omaha, Neb.
For primary bibliographic entry see Field 13I.
AD-646 526 HC$3.00 MF$0.65

EFFECT OF EXTRUDER TEMPERATURE PROFILES ON STRESS-CRACK RESISTANCE OF A POLYETHYLENE SHEATHING COMPOUND,
Bell Telephone Labs., Inc., Murray Hill, N. J.
For primary bibliographic entry see Field 11I.
AD-646 527 HC$3.00 MF$0.65

DESIGN AND MANUFACTURE OF PLASTIC INSULATED ALUMINUM CONDUCTOR TELEPHONE CABLE,
Bell Telephone Labs., Baltimore, Md.
For primary bibliographic entry see Field 17B.
AD-646 541 HC$3.00 MF$0.65

NEW COATING PROCESS FOR FOAMED POLYETHYLENE INSULATED TELEPHONE CABLE,
Sumitomo Electric Industries Ltd., Yokohama (Japan).

For primary bibliographic entry see Field 17B.
AD-646 542 HC$3.00 MF$0.65

THREE TYPES OF CABLE SHEATH PRODUCED BY HIGH FREQUENCY WELDING,
AMF Thermatool, Inc., New Rochelle, N. Y.
For primary bibliographic entry see Field 9A.
AD-646 544 HC$3.00 MF$0.65

A TANDEM WIRE DRAWING AND INSULATING LINE,
Western Electric Co., Inc., Baltimore, Md.
For primary bibliographic entry see Field 9A.
AD-646 546 HC$3.00 MF$0.65

HIGH VISCOSITY THERMAL PROTECTION MATERIALS.
Naval Ordnance Lab., White Oak, Md.
For primary bibliographic entry see Field 11B.
AD-646 616 HC$3.00 MF$0.65

THE BASES OF AUTOMATION AND TECHNICAL CYBERNETICS,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
A. A. Krasovskii, and G. S. Pospelov. 23 Sep 66, 1154p FTD-MT-64-419
TT-67-60994
Edited machine trans. of mono. Osnovy Avtomatiki i Tekhnicheskoi Kibernetiki, Moscov/Leningrad, 1962 600p.

Descriptors: (*Automation, Theory), (*Cybernetics, Theory), Control systems, Automata, Servomechanisms, Signals, Transducers, Synchros, Information theory, Amplifiers, Magnetic amplifiers, Power amplifiers, Relays, Actuators, Servomotors, Hydraulic servomechanisms, Pneumatic servomechanisms, Stabilization systems, Feedback, Synthesis, Pulse modulation, Dynamics, Nonlinear systems, Entropy, Algorithms, Adaptive control systems, Game theory, Dynamic programming.

The book has three sections and contains a systematic account of the theory of elements of automatic devices, the theory of automatic control and the bases of technical cybernetics. A number of transmitters, amplifiers, controllers and regulating devices are discussed. The account of the theory of automatic adjustment includes the dynamics of linear, nonlinear and pulse systems of automatic control. The third section of the book - technical cybernetics - contains the theory of optimalizing control systems and the theory of systems with self-adjusting correcting devices. It touches on certain aspects of automating control processes. (Author)
AD-646 933 HC$3.00 MF$0.65

STUDY OF SPACE ENVIRONMENT FABRICATION AND REPAIR TECHNIQUES FINAL TECHNICAL SUMMARY REPORT.
Hughes Aircraft Co., Culver City, Calif. Materials Technology Dept.
R. D. Engquist, and D. B. Nord. Dec 66, 114p NASA-CR-65568, P66-275
Contract NAS9-4548

Descriptors: *Brazing, *Electron beam welding, *Extraterrestrial environment, *Repair, *Resistance, *Soldering, Aluminum, Beam, Compatibility, Electron, Environment, Extraterrestrial, Fabrication, Feasibility, Gauge, Hermetical, Inconel, Joining, Joint, Magnesium, Seal, Strength, Thickness, Titanium, Tolerance, Welding.

For abstract, see STAR 05 06.
N67-15679 HC$3.00 MF$0.65

STUDIES OF LOW AND HIGH TEMPERATURE CAGE MATERIALS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
D. E. Brewe, H. W. Scibbe, and E. V. Zaretsky. 1967, 31p NASA-TM-X-52262
To Be Presented At The Spring Lubrication Conf., Miami Beach, Fla., 5-7 Jun. 1967, Sponsored By Asme

Descriptors: *Ball bearing, *High temperature material, *Polytetrafluoroethylene, *Self-lubricating material, *Wear, Ball, Bearing, Cage, Cryogenic, Fiber, Filler, Glass, High speed, High temperature Low temperature, Material, Operation, Relative, Self-lubrication, Testing.

For abstract, see STAR 05 06.
N67-16042 HC$3.00 MF$0.65

STUDY, FABRICATION, AND TESTING OF A FOIL BEARING ROTOR SUPPORT SYSTEM QUARTERLY REPORT, PERIOD ENDING 15 NOV. 1966.
Ampex Corp., Redwood City, Calif.
15 Nov 66, 19p NASA-CR-81266, RR-66-38
Contract NASW-1456

Descriptors: *Foil bearing, *Rotor, *Support system, Bearing, Excitation, Fabrication, Feasibility, Foil, High speed, Orbit, Response, Support, System, Testing.

For abstract, see STAR 05 06.
N67-16509 HC$3.00 MF$0.65

A STUDY OF THE EFFECTS OF VARIOUS HEAT INPUT RATES ON T-1A STEEL WELDS.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
R. A. Davis, M. G. Olsen, and S. W. Worden. 14 Nov 66, 39p NASA-TM-X-53537

Descriptors: *Steel, *Temperature effect, *Welded joint, Bending, Design, Effect, Failure, Groove, Hardness, Heat, Joint, Measurement, Plate, Strength, Temperature, Tensile, Test, Thickness, Toughness, Welding.

For abstract, see STAR 05 06.
N67-16541 HC$3.00 MF$0.65

EFFECTIVENESS OF DRY HEAT AND ETHYLENE GAS UPON SPORE CONTAMINATION LOCATED BETWEEN MATED SURFACES AND ON EXTERIOR SURFACES OF VARIOUS MATERIALS.
Army Biological Labs., Fort Detrick, Md. Physical Defense Div.
D. M. Portner. 7 Dec 66, 7p NASA-CR-81344
NASA ORDER R-35

Descriptors: *Dry heat, *Ethylene oxide, *Spacecraft sterilization, Contamination, Dry, Effectiveness, Ethylene, External, Gas, Heat, Hermetical, Internal, Material, Oxide, Seal, Spacecraft, Spore, Sterilization, Surface.

For abstract, see STAR 05 06.
N67-16614 HC$3.00 MF$0.65

PROCESS DESIGN AND COST ESTIMATE FOR PRODUCTION OF 266 MILLION SCF/DAY OF PIPELINE GAS BY THE HYDROGASIFICATION OF BITUMINOUS COAL--HYDROGEN BY THE STEAM-IRON PROCESS,
Institute of Gas Technology, Chicago, Ill.
For primary bibliographic entry see Field 21D.
PB-174 064 HC$3.00 MF$0.65

13I. MACHINERY AND TOOLS

DEVICE FOR LOW-FREQUENCY PHOTOGRAPHY,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 14E.
AD-646 378 HC$3.00 MF$0.65

A DEVICE FOR INDUCTION ANNEALING OF AN ALUMINUM WIRE OR FILAMENT DURING DRAWING OR TWISTING,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 13H.
AD-646 379 HC$3.00 MF$0.65

ON THE FORMULATION OF TWO DIMENSIONAL EDDY CURRENT PROBLEMS OF A COMPRESSIBLE LIQUID IN TURBOMACHINES,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 20D.
AD-646 419 HC$3.00 MF$0.65

EFFECT OF SURFACE-LAYER QUALITY ON THE USEFUL LIFE OF ROLLER BEARINGS,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
L. G. Kuklin. 28 Sep 66, 15p FTD-TT-65-1411
TT-67-60853
Edited trans. of Uralskii Politekhnicheskii Institut, Sverdlovsk. Trudy (USSR), v129 p15-25 1963.

Descriptors: (*Roller bearings, Life expectancy), USSR, Surfaces, Precision finishing, Grinding, Surface properties, Stresses, Hardness, Roughness, Efficiency.

The report presents the results of an investigation of the possibilities of increasing the useful life of roller bearings by improving the surface-layer quality of the operating surfaces of the rollers and of the bearing races. Conclusions are: (1) Grinding cannot be regarded as a final operation in finishing of the operating surfaces of bearings, since the microdefects resulting from the grinding operation lower the efficiency of the surface layers. (2) In the final lapping operations it is necessary to remove the defective layer of 0.15-0.02 mm obtained as the result of the preliminary grinding operation. (3) In dull polishing of rollers and manual polishing of the bearing races a surface layer of low quality is obtained. There is a considerable improvement in the quality of the surface-layer finish and a 30-40-percent increase in useful life after lapping operations: bright polishing of the rollers and superfinishing of the bearing races. (4) In preliminary grinding of the rollers and races it is necessary to introduce machine truing of the grinding wheels and to perform this operation regularly after having removed a specified amount of the bearing part. (5) An increase in surface-finish quality of the operating surfaces to class 10 will permit the plant to increase the useful life of bearings by 30%. (6) The existing technological process does not ensure the required precision in contact between the roller and the bearing race: only a band with a width of 2-4mm is involved in the operation of the bearing. (Author)
AD-646 519 HC$3.00 MF$0.65

MEASURING PERFORMANCE OF AN EIGHT-INCH CABLE SHEATHING EXTRUDER,
Western Electric Co., Inc., Omaha, Neb.
R. D. Mallory, and D. I. Marshall. 1966, 29p
Prepared for presentation at the Annual Wire and Cable Symposium (15th), Atlantic City, N. J., 9 Dec 1966.

Descriptors: (*Industrial equipment, Extrusion), (*Plastic coatings, *Extrusion), Electric cables, Performance (Engineering), Polyethylene plastics, Temperature, Pressure.

Experimental studies on extrusion of polyethylene were carried out on an 8-inch diameter 20/1 length cable jacketing extruder. Objectives included the study of temperature and pressure action, performance evaluation of a new compression-relief type screw, collection of operating data for building a theoretical model of the process, and to provide equipment for a separate study of the effect of operating variables on stress-cracking resistance of product. The extruder was instrumented with 7 pressure transducers, 6 thermocouples in the screw, 23 thermocouples for plastic temperature mounted from the screw, and several thermocouples in the barrel and head. Fifteen equilibrium experiments were performed at various conditions of barrel temperature, screw speed, and die constriction. Strip chart records were made of all instruments, and moving pictures were made of temperature and pressure profiles. Results confirmed that temperature action in the 8-inch machine was similar to that previously reported for a 2.5-inch extruder. Utility of the compression-relief type screw for this application was established. A theoretical model for the process has been fitted to these experiments. (Author)
AD-646 526 HC$3.00 MF$0.65

APPLICATION OF WELDED THIN METAL IN NEW COMMUNICATION CABLE DESIGNS,
Canada Wire and Cable Co. Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 9A.
AD-646 538 HC$3.00 MF$0.65

A TANDEM WIRE DRAWING AND INSULATING LINE,
Western Electric Co., Inc., Baltimore, Md.
For primary bibliographic entry see Field 9A.
AD-646 546 HC$3.00 MF$0.65

ADVANCEMENT OF SPUR GEAR DESIGN TECHNOLOGY.
Final rept., 29 Jun 65-28 Jul 66,
General Motors Corp., Indianapolis, Ind. Allison Div.
Wayne L. McIntire, and Richard C. Malott. Dec 66, 254p EDR-4743
USAAVLABS-TR-66-85
Contract DA-44-177-AMC-318 (T)

Descriptors: (*Gears, Design), Stresses, Bending, Fatigue (Mechanics), Life expectancy, Mechanical drawings, Computer programs, Performance (Engineering).
Identifiers: Spur gears.

The investigation of four geometric variables indicated that the endurance strength was significantly affected by changes in pitch diameter and pressure angle. These effects were in some instances greater than those predicted by bending stress calculations. The effects of fillet size and fillet configuration--full form or protuberance--were not significant with respect to the endurance strength of the configurations tested. Stress calculations did not accurately consider the fillet configuration. A basic material strength curve for carburized AMS-6265 was established by R. R. Moore specimens. This strength curve correlated very closely with the AGMA method of calculating stress. By averaging all fatigue test data points, a design S/N curve was established. For design purposes, a 1-percent failure endurance strength of 102,000 p.s.i. was also established. Of the five strength formulas investigated, the AGMA bending strength formula provides the most accurate method for assessment of spur gear tooth bending strength. The limited dynamic testing conducted indicated that a dynamic factor for lightweight aircraft gears should be considered for applications with a pitch line velocity over 8000 feet/minute. A centrifugal speed factor is necessary for high pitch line velocity applications. A modification is required to the Dolan-Broghamer stress concentration factor used in the AGMA formula to consider tooth geometry more accurately. The AGMA formula modified to incorporate a centrifugal speed, a high speed dynamic factor, and to use R. R. Moore material strength data will produce an accurate estimate of gear tooth bending stress and life.
AD-646 648 HC$3.00 MF$0.65

MAGNETOHYDRODYNAMIC LUBRICATION FLOW BETWEEN PARALLEL PLATES.
Chicago Univ., Ill.
For primary bibliographic entry see Field 11H.
AD-646 806 Not available from CFSTI.

DETERMINATION OF THE PATTERN OF ISOTHERMS IN A METAL CUTTING TOOL USING INFRA RED PHOTOGRAPHY,
Queen's Univ., Kingston (Ontario). Dept. of Mechanical Engineering.
R. Salmon, W. B. Rice, and P. S. Chandrasekaran. 1963, 13p
Grant DRB-9535-03
Prepared in cooperation with Thiagarajar College of Engineering, Madurai, South India.
Availability: Published in Paper no. 63, Mech 24, Engineering Inst. of Canada v1 n29 12p Dec 1963.

Descriptors: (*Machine tools, Heating), (*Infrared photography, Machine tools), (*Cutting tools, Heating), Failure (Mechanics), Cratering, Machining, Temperature, Distribution, Measurement, Infrared radiation, India, Canada.

The paper reports an experimental determination of isotherms in a high speed steel tool during orthogonal cutting of steel. The results indicate that infra red photography provides a convenient practical method of recording tool temperatures after equilibrium conditions have been established.
AD-646 811 Not available from CFSTI.

SURVEY OF PRESENT INFORMATION ON ELASTOHYDRODYNAMIC LUBRICATION OF GEARING.
Navy Marine Engineering Lab., Annapolis, Md.
For primary bibliographic entry see Field 11H.
AD-646 896 HC$3.00 MF$0.65

ELEMENTS AND DRIVES OF POWER FOLLOW-UP SYSTEMS: COLLECTION OF ARTICLES.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
13 Jan 67, 208p FTD-MT-64-92
TT-67-60993
Edited machine trans. of Aviatsionnyi Institut, Moscow. Trudy (USSR), v134 203p 1961.

Descriptors: (*Servomechanisms, Design), (*Control systems, Automatic), (*Flight control systems, Design), (*Actuators, Design), (*Drives, Design), Theory, Feedback, Couplings, Circuits, Hydraulic systems, Nozzles, Fluid amplifiers, Hydraulic valves, Pumps, Hydraulic actuators, Electromechanical converters, Transmissions, Magnetic amplifiers, Push-pull amplifiers, Electron tubes, Networks, Bellows, USSR.

Contents: Fundamentals of the theory of the calculation of combined control systems, by Sciences V. G. Terskov; Questions in the calculation and designing of combined control systems, by Sciences V. G. Terskov; Static and dynamic characteristics of the hydraulic drive 'nozzle-gate-hydraulic cylinder,' by N. A. Borisova; The hydraulic amplifier of the type 'nozzle-gate,' by N. S. Gamynin; Characteristic of the pumps and valves, hydraulic motors used in follow-up systems, by N. S. Gamynin; Characteristic of electromechanical converters with a magnetic spring, by V. I. Gusakov; Selecting the ratio of the power reductors for follow-up drives, by B. I. Petrov; Control characteristics of the reversible magnetic amplifier, working on a complex load, by V. V. Kryuchkov; Parallel and in series connection of two electronic tubes to one load with variable anode feed, by E. M. Reshetnikov; The calculation of the strength of single-layer bellows, used in certain pneumatic devices with large pressure deops, by V. V. Kochinskiy.
AD-646 932 HC$3.00 MF$0.65

A STUDY OF THE RADIAL-AXIAL-FLOW TURBINE WITH LOW BLADE HEIGHTS AND LARGE CLEARANCES.
Issledovaniye Radial'no-osevoy Turbiny S Malymi Vysotami Lopatok I S Bol'shimi Zazorami
National Aeronautics and Space Administration, Washington, D. C.
L. N. Odivanov, and A. P. Tunakov. Dec 66, 15p
NASA-TT-F-10441
Transl. Into English From Aviatsionnaya Tekhnika (Ussr), No. 1, 1964 P 133-144

Descriptors: *Axial flow turbine, *Turbine blade, Axial, Blade, Chamber, Clearance, Collection, Construction, Decrease, Efficiency, Flow, Height, Increase, Operation, Radial, Turbine, Wake.

For abstract, see STAR 05 06.
N67-15558 HC$3.00 MF$0.65

THE EFFECT OF THE SPACE ENVIRONMENT ON LUBRICANTS AND ROLLING ELEMENT BEARINGS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
W. J. Anderson, and D. C. Glenn. 1967, 48p
NASA-TM-X-52268
To Be Presented At The Conf. On Lubrication And Wear - Fundamentals And Appl. To Design, London, 25-28 Sep. 1967, Sponsored By Inst. Of Mech. Engr.

Descriptors: *Bearing, *Lubricant, *Space environment, Boiling, Environment, Evaporation, Grease, Liquid, Metal, Pressure, Reliability, Roller, Silicone, Solid, Space.

For abstract, see STAR 05 06.
N67-16048 HC$3.00 MF$0.65

STUDY, FABRICATION, AND TESTING OF A FOIL BEARING ROTOR SUPPORT SYSTEM QUARTERLY REPORT, PERIOD ENDING 15 NOV. 1966.
Ampex Corp., Redwood City, Calif.
For primary bibliographic entry see Field 13H.
For abstract, see STAR 05 06.
N67-16509 HC$3.00 MF$0.65

EVALUATION OF HIGH-TEMPERATURE BEARING CAGE MATERIALS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
W. J. Anderson, and E. V. Zaretsky. Jan 67, 21p
NASA-TN-D-3821
Contract 720-03-01-01-22

Descriptors: *Bearing, *Hardness, *Lubricant, *Temperature effect, Cage, Effect, Ester, Ether, High temperature, Polyphenyl, Stainless, Steel, Temperature, Wear.

For abstract, see STAR 05 06.
N67-16693 HC$3.00 MF$0.65

ONE WAY ROD ARRESTER. ROLLER DRIVE UNIT,
Stripps Institution of Oceanography, La Jolla, Calif.
Frans J. Emmel. 1965, 6p
Grant NSF-GP-3815

Descriptors: (*Drilling machines, Design), (*Drives, Design), Rods, Pipes, Positioning devices, Cylindrical bodies, Drilling.
Identifiers: Arresting devices, Roller drives.

Two devices are described: (1) an apparatus to prevent the sliding of a rod (e.g., drill rod, piston rod) in a specific direction; (2) a drive which will achieve free sliding movement and rotation of pipes during rotary drilling operations.
PB-174 073 HC$3.00 MF$0.65

STIFF-PART-SUPPORTING BLOCK,
Woods Hole Oceanographic Institution, Mass.
Richard H. Backus, and Asa S. Wing. 10 Dec 65, 5p
Supported by NSF.

Descriptors: (*Hoists, Design), Positioning devices (Machinery), Supports, Wire, Mechanical fasteners, Protection.

A device is described which is designed to prevent the bending and breaking of swivels and other stiff items attached to wires as these items pass through pulley blocks. The device permits the normal passage of wire, buts lifts swivels, etc., clear of the round sheave and supports them over their entire length.
PB-174 074 HC$3.00 MF$0.65

ABSTRACT OF BEARING DEVELOPMENTS AND DATA ON SPINDLES,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
H. S. Green, and A. E. Rains. 4 Nov 66, 30p
Conf-660922-2
Contract AT (29-1)-1106
Prepared for presentation at the International Machine Tool Design and Research Conference (7th), Birmingham (England).

Descriptors: (*Bearings, Machine tools), (*Machine tools, Design).

For abstract, see NSA 21 04.
RFP-734 HC$3.00 MF$0.65

13J. MARINE ENGINEERING

CLEAVAGE FRACTURE OF SHIP PLATES AS INFLUENCED BY SIZE EFFECT.
Illinois Univ., Urbana.
20 Aug 46, 143p
SSC-3
Contracts NObs-31224, NObs-34231

Descriptors: (*Ship plates, Fracture (Mechanics)), Cracks, Tests, Physical properties, Stresses, Metal plates, Steel.

The report contains a description of tests made to determine why ship plates crack in service. The tests were based upon the hypothesis that the cracks begin at points where there are severe geometrical stress-raisers and that the tendency for the plates to crack increased, for specified geometrical characteristics, with an increase in the notch-sensitivity of the steel. (Author)
AD-646 363 HC$3.00 MF$0.65

LOW-ASPECT-RATIO WING THEORY AND ITS APPLICATION TO THE SHIP RUDDER,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
Lui Ying-chung, Shen Hung-tsui, and Liu Heng-mou. 28 Sep 66, 22p FTD-TT-65-1853
TT-67-60767
Edited trans. of Chung Kuo Tsao Ch'uan (Chinese People's Republic), n2 p37-44 1964.

Descriptors: (*Marine rudders, Ships), Aspect ratio, Wings, Theory, Fluid dynamic properties, Angle of attack, Numerical analysis, China.

The 'Prago-Figiaivsky' wing theory of small aspect ratio was generalized, and the formulae for the coefficients of normal force, induced resistance and the center of pressure were established. A method was suggested to evaluate the lower limit of the critical angle of attack. After having recalculated the hydrodynamic forces of a rectangular plate, this method was applied to the ship after rudder and propeller. The results are in satisfactory agreement with the known experimental and calculated results. (Author)
AD-646 368 HC$3.00 MF$0.65

THE ARRANGEMENT OF CIC EQUIPMENT ON A CVL. (SHIPBOARD SYSTEMS STUDIES).
Technical rept.,
Dunlap and Associates, Inc., Stamford, Conn.
Robert M. Thomson, Martin A. Tolcott, and Ralph C. Channell. 27 Apr 49, 7p
SPECDEVCEN-641-3-2
Contract N8onr-641 (03)

Descriptors: (*Combat information centers, Shipborne), (*Aircraft carriers, Combat information centers), Communication equipment, Human engineering, Radar equipment.

The report describes the re-location of a few units of equipment.
AD-646 615 MF$0.65

FOREIGN SCIENCE BULLETIN VOL. 3, NO. 1, 1967.
Library of Congress, Washington, D. C. Aerospace Technology Div.
For primary bibliographic entry see Field 5A.
AD-646 634 HC$3.00 MF$0.65

A METHOD OF ANALYZING PROPELLER-EXCITED VIBRATORY FORCES ON A MODEL.
Research and development rept.,
David Taylor Model Basin, Washington, D. C. Hydromechanics Lab.
Chengi Kuo. Dec 66, 74p
DTMB-2266
Research supported in part by NONR.

Descriptors: (*Ship hulls, Vibration), Force (Mechanics), Ship models, Propellers (Marine), Model tests, Computer programs, Generators.

A very brief description is given of a technique which involves the use of elastical isolation of the model stern to evaluate propeller-excited vibratory forces on models. The method of analyzing the results obtained in the experiments is given in detail and its application is illustrated by an example. (Author)
AD-646 678 HC$3.00 MF$0.65

DETERMINATION OF A SHIP'S WAVE RESISTANCE IN A CANAL FROM MEASUREMENTS OF WAVE PROFILES,
California Univ., Berkeley. Hydraulic Engineering Lab.
Toshiaki Mizuno, and John V. Wehausen. Dec 66, 37p HEL-12-4
Contract DA-49-055-CIV-ENG-65-5

Descriptors: (*Ship models, Stability), Water waves, Determination, Inland waterways, Stereoscopic photography, Wake, Numerical analysis, Measurement.

The report presents the results of an analysis of data obtained from stereophotographs of the wave pattern in the wake of a ship model moving at constant speed (V/square root of gL = 0.367). The data were used to compute the wave resistance of the model following a procedure suggested by Eggers. Several methods of carrying out this procedure are discussed and the numerical results from two of them are compared with the residuary resistance obtained from a towing test. The wave resistance obtained by a least-squares method of analysis is quite close to the residuary resistance. (Author)
AD-646 729 HC$3.00 MF$0.65

EQUATIONS AND COMPUTER PROGRAM TO CALCULATE THE THERMAL HISTORY OF A DUAL-LAYERED PLATE SUBJECT TO THE THERMAL PULSE OF A NUCLEAR WEAPON.
Progress rept.,
Naval Applied Science Lab., Brooklyn, N. Y.
R. J. Heilferty, J. E. Koch, and M. L. Cohen. 28 Dec 66, 80p Rept. no. 9400-105, PR-3
Not reproducible per CFSTI standards.

Descriptors: (*Ships, *Thermal radiation), (*Nuclear weapons, Thermal radiation), (*Computer programs, Thermal properties), Equations, Ship plates, Vulnerability, Mathematical analysis.

A generalized computational technique to be used in the calculation of the temperature profiles and histories in single and dual layered plates exposed to the thermal pulse of a nuclear weapon is presented. The program was written to accommodate materials whose thermophysical properties are an arbitrary function of the local temperature. In addition, quite general boundary conditions are permitted. Sample calculations are presented in order to illustrate the nature of the output format. (Author)
AD-646 858 Not available from CFSTI.

WINDOWS FOR EXTERNAL OF INTERNAL HYDROSTATIC PRESSURE VESSELS. PART I. CONICAL ACRYLIC WINDOWS UNDER SHORT-TERM PRESSURE APPLICATION.
Naval Civil Engineering Lab., Port Hueneme, Calif.
For primary bibliographic entry see Field 13M.
AD-646 882 HC$3.00 MF$0.65

AN INVESTIGATION TO DETERMINE THE APPLICABILITY OF HIGH YIELD STEEL IN THE CONSTRUCTION OF TRANSVERSELY FRAMED SHIPS.
California Univ., Berkeley. Coll. of Engineering.
Ronald K. Kiss. Nov 66, 72p NA-66-11
Contract MA-2620

Descriptors: (*Steel, *Ship structural components), Structural properties, Loading (Mechanics), Ship plates, Ship decks, Beams (Structural), Design, Cargo ships, Weight, Costs.

The report contains the results of a series of rational structural analyses of Mariner midship sections in which high yield steel was used. A series of analyses was necessary because frame spacing was varied from 30 in. to 60 in. The ultimate goal of the study was to indicate a method of reducing the cost of ship structure; either by simplifying the structure or by significantly reducing the weight. The cost parameters used were weight per foot of midship section, weight of weld metal deposited per foot of midship length, number of structural parts per foot, and length of joints per foot of midship length. The latter two remained unchanged despite the use of high yield steel, while there was a significant reduction in the weight of the midship section per foot of length and the weight of weld metal deposited per foot of midship length. The reduction increased substantially with increasing frame spacing, indicating that in transversely framed ships the desirability of high yield steel tends to increase with frame spacing. (Author)
PB-174 022 HC$3.00 MF$0.65

A STUDY OF THE FUTURE OF A MARINE TERMINAL INDUSTRY AND OF THE FEASIBILITY OF DEVELOPING NEW MARINE TERMINAL FACILITIES IN OAKLAND, CALIFORNIA. PHASE I. THE OUTLOOK FOR NEW MARINE TERMINAL FACILITIES AT THE PORT OF OAKLAND.

Daniel, Mann, Johnson, and Mendenhall, Los Angeles, Calif.
Apr 66, 188p
Prepared in cooperation with Economic Development Administration, Washington, D. C. Availability: Original document in color until exhausted.

Descriptors: (*Shipping (Marine), California), (*Marine engineering, Shipping (Marine)), Feasibility studies, Economics, Commerce, Cargo ships, Piers, Transportation, Water traffic, Merchant vessels, Harbors, Money, Industrial production.

The study reports that substantial benefits will accrue to Oakland and to the Bay Area as a result of increased waterborne trade. Since the ability of Oakland to accomodate this increased tonnage depends on the construction of the necessary facilities, it is recommended that Oakland's plans for construction of new facilities go forward.
PB-174 058 HC$3.00 MF$0.65

SELF-LATCHING HOOK,
Woods Hole Oceanographic Institution, Mass.
Asa S. Wing. 10 Dec 65, 7p
Supported in part by NSF.

Descriptors: (*Hooks, Design), (*Ship auxilary equipment, Hooks), Mechanical fasteners, Oceanographic equipment, Handling, Safety.

A device is described which will enable one man alone to attach and remove instrument cases and other items to a cable, ring, rod or other similar carrier with minimum effort and as quickly as possible, in such a manner that the attached instrument case or other item will remain securely attached despite severe vibration, oscillation and strain on the carrier and carried item during the time they are intended to be fastened together.
PB-174 078 HC$3.00 MF$0.65

SHIP'S BRIDGE CONTROL CONSOLE SYSTEM.
Study rept.,
Sperry Piedmont Co., Charlottesville, Va.
V. E. Williams, and T. F. Noble. Sep 64, 168p
Pub-JA-250-0043A
Contract MA-2720
Report on Ship's Controllability System. See also PB-174 089.

Descriptors: (*Ships, Control systems), (*Control systems, Performance (Engineering)), Steering, Automatic, Ship hulls, Marine rudders, Design, Stability, Yaw, Control panels, Marine engineering.

The report is confined primarily to controlled ship steering performance. However, steering performance depends on other factors not explicitly considered variables in the study but implicit in the nature of the problem. In particular, the study was concerned to a degree with the dynamics of ship hulls and rudder design and, thus, ship stability. Essentially, the study took the following form: find the functional relationship of all factors that affect the steering loop performance as a function of control modes, keeping the other factors that affect performance constant. For successful attack on this problem, it was necessary: (a) that the functional relationships be well understood and; (b) that the system be studied for realistic values of the 'constants'. Within these guidelines the study was restricted to a Mariner hull and conventional rudders. Eventually, of course, it will be desirable to explore other important areas of ship control, such as dynamic stability versus rudder activity and others.
PB-174 088 HC$3.00 MF$0.65

SHIP'S BRIDGE CONTROL CONSOLE. OPERATIONAL EVALUATION OF BENEFITS LIMITATIONS AND RECOMMENDATIONS.
Final research rept.,
Sperry Piedmont Co., Charlottesville, Va.
H. M. Ferrell, T. F. Noble, and W. R. Carson. Oct 66, 101p Pub-JA-250-0077
Contract MA-2720
See also PB-174 088.

Descriptors: (*Command + control systems, Installation), (*Ships, Command + control systems), Operators (Personnel), Communication systems, Steering, Navigation, Ship auxiliary equipment, Control panels, Navigational aids, Navigation computers, Maneuverability, Automation, Marine engineering.

This report describes the installation and field evaluation of the prototype Ship's Bridge Control Console from March 1964 to July 1965. The report describes primarily the technical problems encountered in console operation, and the reactions of ship operations personnel to the console. Reliability and functional propriety are discussed. A detailed analysis of areas where further work efforts are required is presented, together with some suggested approaches for improving the conning efficiency of ship's watch officers.
PB-174 089 HC$3.00 MF$0.65

LOOKOUT ASSIST DEVICE FEASIBILITY STUDIES. VOLUME I. HUMAN FACTORS, COLLISION STATISTICS, ECONOMICS FACTORS OPERATIONS RESEARCH, SENSOR TECHNIQUES.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 090 HC$3.00 MF$0.65

LOOKOUT ASSIST DEVICE FEASIBILITY STUDIES. VOLUME II. SYSTEM RECOMMENDATIONS, (PROXIMITY AND TAU SYSTEMS), PERFORMANCE ESTIMATES, SYSTEMS PARAMETERS STUDY, A TAU CRITERION DISPLAY SYSTEM.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 091 HC$3.00 MF$0.65

LOOKOUT ASSIST DEVICE FEASIBILITY STUDIES. VOLUME III. USAGE OF SOUND AT SEA, CONNING FUNCTION STUDIES, CUE SOURCES AND THEIR VALUE, PSYCHOACOUSTICS, PHYSICAL FACTORS, WORK ACTIVITY FACTORS.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 092 HC$3.00 MF$0.65

LOOKOUT ASSIST RADAR EVALUATION PROGRAMS.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 093 HC$3.00 MF$0.65

LOOKOUT ASSIST RADAR DEVELOPMENT.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 094 HC$3.00 MF$0.65

13K. PUMPS, FILTERS, PIPES, FITTINGS, TUBING, AND VALVES

RESPONSE OF A BURIED PROTOTYPE COMMUNICATIONS CONDUIT TO STATIC AND DYNAMIC LOADING.
Technical rept.,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
A. F. Dorris, and G. E. Albritton. Dec 66, 81p
AEWES-TR-1-750
Research sponsored by Bell Telephone Labs.
Availability: Hard copy available from Army Engineer Waterways Experiment Station, Corps of Engineers, Vicksburg, Miss., $1.00.

Descriptors: (*Ducts, Underground), Loading (Mechanics), Communication equipment, Soil mechanics, Sand, Clay, Interactions.

The objectives of the study were to determine the response of a buried prototype communications conduit in two types of soil media when subjected to either static or dynamic plane-wave surface overpressures, and to evaluate the ability of the conduit to withstand a nuclear blast overpressure of 1,000 psi. Static and dynamic tests were conducted on sections of 4-inch-diameter, 1/16-inch-thick, steel conduit in the Small (4-foot-diameter) Blast Load Generator. The test sections were buried at depths of 2, 4, and 16 inches in a dense, dry sand and at 8 inches in a stiff clay. Measurements were made of strain in the cylindrical sections and the surface overpressure. The conduit buried in sand was subjected to 466-psi static overpressure and 295-psi dynamic overpressure without significant yielding at a fiber and without structural failure. In stiff clay, collapse of the conduits occurred under 348- and 420-psi static loading, respectively, in two tests. The hydrostatic buckling equation underestimated the failure overpressure determined from the tests of conduits buried in clay. It appears that the conduit buried at depths greater than three times its diameter in a material approximating a dense, dry sand should be able to withstand, conservatively, dynamic surface overpressures of 1,000 psi. (Author)
AD-646 608 MF$0.65

MODIFICATIONS IN DESIGN IMPROVE DREDGE PUMP EFFICIENCY,
Lehigh Univ., Bethlehem, Pa. Fritz Engineering Lab.
John B. Herbich. Sep 62, 163p [377,55]
Contract DA-36-109-C1VENG-59-112

Descriptors: (*Centrifugal pumps, Earth-handling equipment), Performance (Engineering), Efficiency, Impellers, Design, Model tests, Transport properties.

The study was primarily concerned with development of an efficient pump handling silt-clay-water mixtures. One phase of the study involved recommendations for design changes of the dredge pump, involving modifications in the volute and the impeller. In another phase of the study, model investigation of four differently modified impellers was performed with water as well as silt-clay-water mixtures. The variables included discharge (0-1200 gallons per minute), speed (1150 to 1900 revolutions per minute), and liquid density (1000 to 1380 grams per liter). Analysis of the data indicates that certain modifications in the exit angle and vane shape of the impeller result in a marked increase in pump efficiency. Relationships between various parameters was established for all pump impellers investigated. (Author)
AD-646 794 HC$3.00 MF$0.65

EXPERIMENTAL STUDY OF STEADY-STATE AND DYNAMIC PERFORMANCE OF A PROPORTIONAL FLUERIC DIVERTER VALVE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
M. J. Le Roy, Jr.. Jan 67, 13p NASA-TM-X-1293
Contract 701-04-00-08-22

Descriptors: *Closed loop system, *Dynamic response, *Gas valve, *Steady state flow, Air, Characteristics, Closed, Control, Device, Discharge, Diverter, Dynamic, Flow, Frequency, Gain, Gas, Load, Loop, Performance, Power, Rankine cycle, Response, Speed, State, Steady, System, Test, Turboalternator, Valve.

For abstract, see STAR 05 06.
N67-16676 HC$3.00 MF$0.65

13L. SAFETY ENGINEERING

LIST OF LIBRARY ACCESSIONS.
Federal Fire Council, Washington, D. C.
30 Jan 67, 9p

Descriptors: (*Fire safety, Bibliographies), Subject indexing, Reports, Handbooks, United States Government.

The report contains the latest publications received in the Federal Fire Council's fire safety reference library. These items are available for loan for a three week period. The source for each publication usually is identified so that persons can request copies directly. (Author)
AD-646 500 HC$3.00 MF$0.65

EFFECT OF INORGANIC SALTS ON PYROLYSIS OF WOOD, ALPHA-CELLULOSE, AND LIGNIN DETERMINED BY DYNAMIC THERMOGRAVIMETRY.
Forest Products Lab., Madison, Wis.
For primary bibliographic entry see Field 11L.
AD-646 562 HC$3.00 MF$0.65

EXPLOSIVE SAFETY EXECUTIVE LECTURE SERIES FINAL REPORT.
TRW Systems, Cocoa Beach, Fla.
Jun 65, 152p NASA-CR-81250
Contract NAS10-2189

Descriptors: *Explosive, *Management planning, *Propellant sensitivity, *Safety hazard, *Static electricity, Accident, Burn, Combustion, Damage, Deflagration, Detonator, Electricity, Facility, Friction, Hazard, Ignition, Impact, Launching, Lightning, Liquid, Management, Ordnance, Planning, Prevention, Propellant, Safety, Sensitivity, Shock, Solid, Space vehicle, Static, Wave, Wiring.

For abstract, see STAR 05 06.
N67-15981 HC$3.00 MF$0.65

LOOKOUT ASSIST DEVICE FEASIBILITY STUDIES. VOLUME I. HUMAN FACTORS, COLLISION STATISTICS, ECONOMICS FACTORS OPERATIONS RESEARCH, SENSOR TECHNIQUES.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 090 HC$3.00 MF$0.65

LOOKOUT ASSIST DEVICE FEASIBILITY STUDIES. VOLUME II. SYSTEM RECOMMENDATIONS, (PROXIMITY AND TAU SYSTEMS), PERFORMANCE ESTIMATES, SYSTEMS PARAMETERS STUDY, A TAU CRITERION DISPLAY SYSTEM.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 091 HC$3.00 MF$0.65

LOOKOUT ASSIST DEVICE FEASIBILITY STUDIES. VOLUME III. USAGE OF SOUND AT SEA, CONNING FUNCTION STUDIES, CUE SOURCES AND THEIR VALUE, PSYCHOACOUSTICS, PHYSICAL FACTORS, WORK ACTIVITY FACTORS.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 092 HC$3.00 MF$0.65

LOOKOUT ASSIST RADAR EVALUATION PROGRAMS.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 093 HC$3.00 MF$0.65

LOOKOUT ASSIST RADAR DEVELOPMENT.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 094 HC$3.00 MF$0.65

13M. STRUCTURAL ENGINEERING

PROTECTIVE STRUCTURES AND COMPONENTS: COMPILATION OF ABSTRACTS.
Library of Congress, Washington, D. C. Aerospace Technology Div.
For primary bibliographic entry see Field 5A.
AD-646 390 HC$3.00 MF$0.65

CALCULATION OF THE STRENGTH OF METALLIC AND PLASTIC CYLINDRICAL VESSELS, REINFORCED BY A WIND OF HIGH-STRENGTH MATERIAL,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
A. V. Amelyanchik. 9 Sep 66, 34p FTD-MT-65-154
TT-67-60777
Edited machine trans. of Prochmost i Dinamika Avia tsionnykh Dvigatelei; Sbornik Statei (USSR), n1 p3-22 1964.

Descriptors: (*Structural shells, Filament wound construction), Cylindrical bodies, Reinforcing materials, Stresses, Glass textiles, Plastics, Steel, Aluminum alloys, Titanium alloys, Pressure vessels, Structural properties.

Two cases of calculation of strength in reference to glass plastic vessels are analyzed. The method allowing determination of interesting magnitudes by selection (trial and error method) is discussed. It is shown that for analysis of the strained condition of cylindrical vessels from glass plastics, it is possible to apply the same treatment as when investigating metallic vessels with winding. The following cases are considered: (1) a vessel with strained winding at an angle to the generatrix; (2) a glass plastic vessel.
AD-646 420 HC$3.00 MF$0.65

GLUING AMMONIUM - SALT - TREATED SOUTHERN PINE WITH RESORCINOL-RESIN ADHESIVES.
Forest Products Lab., Madison, Wis.
For primary bibliographic entry see Field 11L.
AD-646 565 HC$3.00 MF$0.65

FOREST PRODUCTS LABORATORY LIST OF PUBLICATIONS ON SANDWICH CONSTRUCTION.
Forest Products Lab., Madison, Wis.
Dec 66, 29p
Prepared in cooperation with University of Wisconsin.

Descriptors: (*Sandwich construction, Catalogs), (*Honeycomb cores, Catalogs), Structural parts, Panels (Structural), Adhesives, Sandwich panels, Loading (Mechanics), Elasticity, Buckling (Mechanics).

Contents: Adhesives; Cores; Cylinders and curved panels; Flat panels and strips; Tests and environment.
AD-646 569 HC$3.00 MF$0.65

SOME ASPECTS OF CYLINDRICAL SHELL PANEL FLUTTER.
Technical information series,
General Electric Co., Philadelphia, Pa. Missile and Space Div.
L. L. Carter, and R. O. Stearman. Feb 67, 14p
R67SD1
Contract AF 49 (638)-1639
Prepared in cooperation with Texas Univ., Austin, Dept. of Aeronautical Engineering. Presented at the AIAA Aerospace Sciences Meeting (5th), New York City, 23-26 Jan 1967.

Descriptors: (*Panels (Structural), Flutter), Structural shells, Cylindrical bodies, Theory, Structural properties.

The investigation makes a direct comparison of cylindrical shell panel flutter boundaries obtained analytically with recent experimental boundaries reported in the literature. Further, an attempt was made to explain the discrepancies of the comparison through refinements of some structural aspects of the analysis. The non-linear Donnell shell theory is utilized together with the first-order, high Mach number approximation to the linear potential flow theory. The axisymmetric pre-flutter deformation, due to internal pressurization and axial loading of the shell in the presence of an air stream, is included in the analysis as the configuration about which the shell flutters. The structural boundary conditions assumed for the flutter state are the simply-supported, zero-traction boundary conditions as well as the classical, simply-supported boundary conditions. The problem associated with the pre-deformation state of the shell was solved exactly, whereas the approximate technique due to B. G. Galerkin was employed to solve the linearized system of flutter equations. In general, it is shown that agreement exists between the theory and experiment only in the region of small amounts of static loading of the shell.
AD-646 574 HC$3.00 MF$0.65

STIFFNESS DESCRIBER OF CONICAL AND HEMISPHERICAL FILAMENT WOUND STRUCTURES,
Giannini Controls Corp., Malvern, Pa. Astromechanics Research Div.
Jacob M. Miller. Sep 66, 51p
AFOSR-66-1944
Contract AF 49 (638)-1509
See also AD-626 226.

Descriptors: (*Structural shells, Mathematical models), (*Filament wound construction, Structural shells), Hemispherical shells, Conical bodies, Structures, Matrix algebra.

The report presents a technique for determining the Stiffness Describer for conical and hemi-spherical filament wound structures. The expressions that were derived are extensions of the expressions presented in AFOSR Scientific Report 65-2214 (AD-626 226), which was restricted to cylindrical filament wound structures. The Describer, portrayed herein, uses the same mathematical modeling of filament wound structures and shell strain energy expressions as the previous report. The departure from the previous report came in relating the radii to the axial dimensions prior to integrating the strain energy expression. (The previously reported expressions for a cylinder had a constant radius, regardless of axial dimensions.) The technique described in this, and the preceding report, provides the dynamicist with means to analyze filament wound structures composed of cylinders, cones, and hemi-spheres. The data that is needed in order to use these expressions are physical properties such as: Poisson's Ratio, Moduli of Elasticity and Rigidity for the filament and resin, winding angles of plies, geometric data such as length, base radius, over-all thickness, and cone angle. (Author)
AD-646 595 HC$3.00 MF$0.65

TEST PROGRAMME ON ALUMINIUM HONEYCOMB SANDWICH COMPRESSION PANELS.
Summary rept.
Short Bros. and Harland Ltd., Castlereagh (England).

Nov 66, 40p
MA-S/T Memo-10/66

Descriptors: (*Sandwich panels, Honeycomb cores), (*Honeycomb cores, Panels (Structural)), Aluminum alloys, Sheets, Metal plates, Bonding, Adhesives, Compressive properties, Buckling (Mechanics), Stresses.

Forty-two panels constructed of DTD 546 aluminium alloy sheet bonded to 1/4 in. cell hexagonal honeycomb X 0.001 in. aluminium foil to BS.1470 N.S.3. with Redux 775R adhesive were tested to confirm buckling stresses predicted by the theory of the R.Ae.S. Data Sheets. Good general agreement was obtained between actual and estimated buckling stresses but there was some scatter in results for panels in the plastic range. The effect of the ratio of skin thickness on the value of the shear modulus honeycomb cores as found by the shear beam technique was also investigated and an expression for effective shear area giving reasonably constant values of shear modulus over a wide range of skin and core thickness was obtained. Double block shear specimens were found to be less reliable than shear beams in determination of shear modulus.
AD-646 639 HC$3.00 MF$0.65

ON THE FOUNDATIONS OF THE THEORY OF ELASTIC SHELLS.
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 20K.
AD-646 691 Not available from CFSTI.

INFLUENCE COEFFICIENTS FOR SEMI-INFINITE AND INFINITE CIRCULAR CYLINDRICAL ELASTIC SHELLS.
Massachusetts Inst. of Tech., Cambridge.
James G. Simmonds. 15 Jun 65, 24p
Contract Nonr-3963 (29)
Prepared in cooperation with Virginia Univ., Charlottesville.
Availability: Published in Journal of Mathematics and Physics v45 p127-49 Jun 1966.

Descriptors: (*Elastic shells, *Loading (Mechanics)), Cylindrical bodies, Differential equations.
Identifiers: Influence coefficients.

Influence coefficients were calculated for semi-infinite and infinite circular cylindrical elastic shells subject to self-equilibrating loads applied along a circular edge and along a circular line on the surface, respectively.
AD-646 693 Not available from CFSTI.

WAVE FORCES ON CIRCULAR CYLINDRICAL PILES USED IN COASTAL STRUCTURES.
Technical rept.,
California Univ., Berkeley. Hydraulic Engineering Lab.
Yuan Jen. Jan 67, 103p HEL-9-11
Contract DA-49-055-CIVENG-65-6

Descriptors: (*Foundations (Structures), Force (Mechanics)), (*Ocean waves, Foundations (Structures)), Hydrodynamics, Harmonic analysis, Drag, Water waves, Seacoast, Supports, Cylindrical bodies.
Identifiers: Piles (Structural).

Laboratory studies were made on a 6-inch diameter circular pile, using both regular and irregular waves. Detailed force analyses were made of both sets of data. Harmonic analyses of the total horizontal force acting on a pile was made in order to examine carefully the mass coefficient and drag coefficient. An attempt was made to relate these coefficients to certain dimensionless parameters. Dimensional analysis showed that the coefficients depended not only upon Reynolds number, Froude number, and Iversen's modulus, but also upon the water depth-wave length ratio d/L and the time parameter t/T. (Author)
AD-646 741 HC$3.00 MF$0.65

STRUCTURAL GUIDELINES FOR MATERIALS DEVELOPMENT. PART III. GUIDELINES FOR TENSION AND COMPRESSION STRUCTURES.
Final rept.,
Allied Research Associates, Inc., Concord, Mass.
H. Becker. Feb 67, 55p ARA-304-7
Contract NOw-65-0595
See also AD-640 992.

Descriptors: (*Materials, Structural properties), (*Structures, Design), Mechanical properties, Efficiency, Temperature, Compressive properties, Tensile properties, Cryogenics, Fatigue (Mechanics).

By means of an examination of the sensitivity of structural efficiency to mechanical properties of materials, broad evaluations are generated which may serve as structural guidelines for materials development. Results are presented for tension structures under static loading and in fatigue, and for compression structures. Effects of temperature are considered. For evaluation of tension structures, the use of the ductility ratio concept was found to be fruitful. In addition to providing data on structural strength, it also appears to provide an engineering approach to evaluation of material strength under static loading, and to act as a springboard for assessing the sensitivity of materials to fatigue. The sensitivity of compression structures was investigated through the use of results from minimum weight analysis in which weight/strength ratio is expressible in terms of material parameters and the structural design index. (Author)
AD-646 809 HC$3.00 MF$0.65

METHODS OF SHELTER COST ANALYSIS.
Final rept.,
Hayes, Seay, Mattern and Mattern, Roanoke, Va.
Byrd H. Barksdale, Jr., and Samuel R. Wade. Feb 67, 168p
Contract OCD-PS-65-151

Descriptors: (*Fallout shelters, Costs), Data processing systems, Standards, Design, Construction materials, Lighting equipment, Cooling + ventilating equipment, Labor, Maintenance, Construction, Buildings, Civil defense systems.

The report presents the results of an examination of computer methods of determining immediate and long-term total cost of shelter incorporated within a building at a preliminary design stage. All cost items comprising total cost were investigated and analyzed. This study concluded that many of the items comprising long-term total cost were indeterminate to such a degree that computer methods of analysis would not produce defensible estimates. To develop a method of shelter cost analysis, at a preliminary design stage, will require development of standards and design logic to analyze the effects of changes in building geometry and components to provide protection against effects of nuclear weapons. These factors, which may be identified, influence costs and a program may be developed to account for the factors in producing estimater. Once this data is developed, and with the application of an In-Place Unit Method of cost estimating, realistic immediate alternative shelter cost estimates may be produced. It is believed that development and implementation of these techniques would make it practical to quickly assess protection factors and the impact of cost of changes in geometry, mass, aperture, lighting and ventilation. Probably one of the most useful applications would be in sensitivity analysis of several alternatives to determine optimum shelter cost. (Author)
AD-646 847 HC$3.00 MF$0.65

PRELIMINARY TESTS ON A SHALLOW UNREINFORCED CONCRETE SHELL.
Technical rept.,
Naval Civil Engineering Lab., Port Hueneme, Calif.
J. R. Allgood, R. D. Rail, and R. H. Chiu. Jan 67, 77p NCEL-TR-510

Descriptors: (*Structural shells, Concrete), Floors, Design, Casting, Compressive properties, Failure (Mechanics), Theory, Stresses, Structural properties.

Available information on shallow thin shells with a rectangular plan is reviewed, experience with the sagging membrane casting technique is reported, and the results of tests on three models and one large shell are reported. The experimental results are compared with the membrane and the Haidukov theories. An unreinforced concrete shell 7/16 inch thick with plan dimensions of approximately 8 feet by 8 feet and a rise of 5.5 inches sustained a uniform load of 250 psf before failing in a local transitional buckling mode. One of the model shells approximately 19 inches square by 1/8 inch thick carried a uniform 'plate' load of 1,122 psf. Some information on the behavior of these shallow shells under a concentrated load was obtained. Shallow compressive membranes may be suitable for floor systems in ordinary buildings and bridges, resulting in a considerable reduction in the cost of materials and labor. (Author)
AD-646 860 HC$3.00 MF$0.65

WINDOWS FOR EXTERNAL OF INTERNAL HYDROSTATIC PRESSURE VESSELS. PART I. CONICAL ACRYLIC WINDOWS UNDER SHORT-TERM PRESSURE APPLICATION.
Technical rept.,
Naval Civil Engineering Lab., Port Hueneme, Calif.
J. D. Stachiw, and K. O. Gray. Jan 67, 104p
NCEL-TR-512

Descriptors: (*Transparent panels, Acrylic resins), (*Pressure vessels, Transparent panels), Conical bodies, Hydrostatic pressure, Structures, Underwater, Loading (Mechanics), Failure (Mechanics), Structural properties.

Conical acrylic windows for fixed ocean-floor structures were placed under short-term loading (pressurization from zero to failure at a fixed rate). The windows, of different thicknesses and different included conical angles, were subjected to various applied pressures, and their subsequent behavior was studied. Acrylic windows, in the form of truncated cones with included angles of 30_1, 60_1, 90_1, 120_1, and 150_1, were tested to destruction at ambient room temperature by applying hydrostatic pressure to the base of the truncated cone at a continuous rate of 650 psi/min. The pressure at which the windows failed and the magnitude of displacement through the window mounting at different pressure levels were recorded. The ultimate strength of the conical windows (denoted by the critical pressure at which actual failure occurred) was found to be related both to thickness and included conical angle. Graphs are presented defining the relationships of critical pressure versus thickness-to-diameter ratio, and pressure versus magnitude of displacement for the windows. Nondimensional scaling factors for critical pressure and displacement applicable to large-diameter windows are discussed and presented in graphic form. (Author)
AD-646 882 HC$3.00 MF$0.65

THE EXPLORATION OF FACTORS DETERMINING THE FATIGUE STRENGTH OF COMPOSITE BEAMS WITH A REDUCED NUMBER OF SHEAR CONNECTORS IN HIGHWAY BRIDGES.
Final rept.,
North Carolina State Univ., Raleigh. Dept. of Engineering Research.
M. E. Uyanik, J. E. Clark, and C. T. Wilson. Jun 66, 34p Rept. no. 0549
Prepared in cooperation with Dept. of Public Roads, Washington, D. C.

Descriptors: (*Bridges, Construction), (*Beams (Structural), Bridges), Roads, Studs, Concrete, Steel, Reinforcing materials, Fatigue (Mechanics), Loading (Mechanics), Bending, Stresses, Specifications, Moment of inertia.

Study of the results of other investigators indicate that the fatigue strength of shear connectors and the AASHO 'useful capacity' are unrelated in value and that a more economical 'useful capacity' based on fatigue strength should be established resulting in a reduction in the number of shear connectors used in composite beams subjected to repeated loads. One composite specimen was designed and tested. However, during the test the loading equipment failed to operate properly and the testing was stopped. In repairing the equipment the specimen was loaded beyond the design load resulting in static failure of the shear connectors. No conclusions can be drawn from this one test.

PB-174 006 HC$3.00 MF$0.65

INFLUENCE OF LOAD HISTORY ON CRACKING IN REINFORCED CONCRETE,

California Univ., Berkeley. Div. of Structural Engineering and Structural Mechanics.

For primary bibliographic entry see Field 11B.

PB-174 011 HC$3.00 MF$0.65

FRICTION LOSS IN POST TENSIONED PRESTRESSING STEEL UNITS,

California State Div. of Highways.

Thomas J. Bezouska. Sep 66, 39p Rept. no. 0678

Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Reinforced concrete, Beams (Structural)), (*Reinforcing materials, Friction), Steel, Lubrication, Cables (Mechanical), Measurement.

Identifiers: Prestressed concrete.

The report describes and presents the results of a field investigation of friction losses in post tensioned prestressing cables. The cables were imbedded in a three-span continuous box girder structure, 360 feet long, and horizontally curved. Three different post tensioning systems were used employing both bright and galvanized tendons and ducts. Water soluble oil was used as a lubricant on four of the ten research tendons in order to determine the oil's effectiveness in reducing friction. Jacking forces were measured with load cells as well as strain gages fastened to the tendons. Major conclusions from the study were: (1) The friction coefficients listed in the 1961 AASHO Bridge Specifications are applicable to this type of structure. (2) The overall experience with strain gages mounted on the tendons was not very satisfactory. Instead, the use of load cells at both ends of a tendon is recommended for the accurate measurement of the total friction loss. (3) For some of the tendon-casing combinations, lubrication appears to reduce the friction loss. However, it was not possible to completely flush out all the oil from the casings prior to grouting, and poor bonding resulted because of this. (Author)

PB-174 012 HC$3.00 MF$0.65

AN ANALYTICAL STUDY OF EIGHT DIFFERENT TYPES OF HIGHWAY BRIDGE STRUCTURES.

Progress rept.,

Maryland Univ., College Park. Dept. of Civil Engineering.

C. P. Heins, Jr., and C. T. G. Looney. Sep 66, 295p

Prepared in cooperation with Maryland State Roads Commission, and Bureau of Public Roads, Washington, D. C. Report on Study of Effect of New Vehicle Weight Law on Structure.

Descriptors: (*Bridges, Structural properties), Roads, Moments, Deflection, Stresses, Loading (Mechanics), Computer programs.

The report presents calculated moments and deflections for eight highway bridges of different types. The live loading used on all bridges is the Bureau of Public Roads test truck loaded to approximate an H20-S16, AASHO design loading. The bridges are treated as orthotropic plates. Two methods are used to solve the plate equation, a slope-deflection method, and a finite difference method. Results from the two methods compare well for each bridge. Some comparisons are made between results obtained from design values based on the 1961 AASHO Bridge Specifications and the calculated values. Stresses and deflections based on specifications were always higher than those obtained from the analytical solutions. Appendixes to the report contain several computer programs which were used in the analytical solutions. (Author)

PB-174 015 HC$3.00 MF$0.65

THE BEHAVIOR OF THIN-WEB PLATE GIRDERS UNDER REPEATED LOADING.

Summary rept.,

Lehigh Univ., Bethlehem, Pa. Fritz Engineering Lab.

B. T. Yen, and J. A. Mueller. Aug 66, 25p Rept. no. 303.13

Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Beams (Structural), Loading (Mechanics)), Fatigue (Mechanics), Cracks, Stresses, Failure (Mechanics), Deflection, Structural properties, Bridges, Metal plates, Welds.

Thin-web plate girders behave in a different manner than beams when subjected to repeated loading. Repeated lateral web movements cause fatigue cracks along web boundaries. The pattern of web deflections under load, the occurrence of cracks and their locations, and the estimate of stresses in girders are all described on the basis of experimental and analytical results. The possibility of using slender-web girders for highway bridges is discussed. (Author)

PB-174 019 HC$3.00 MF$0.65

COMPUTER AIDED CHECKING OF DESIGN DOCUMENTS FOR COMPLIANCE WITH REGULATORY CODES.

Bolt Beranek and Newman, Inc., Cambridge, Mass.

Jul 65, 54p BBN-1260

Research supported in part by NBS.

Descriptors: (*Hospitals, Design), (*Specifications, Hospitals), Buildings, Construction, Programming (Computers), Data processing systems, Data storage systems, Information retrieval, Input-output devices, Digital computers.

There are many actions in the process of design and construction of buildings that offer promise for improvement or cost reduction through use of digital computer techniques. One such action that has a high labor cost and is often a bottleneck in the sequencing of building operations is that of checking design documents for compliance with codes promulgated by regulatory agencies. A preliminary study of the application of computer technology to this code checking function is summarized in this report.

PB-174 095 HC$3.00 MF$0.65

PERFORMANCE CONCEPTS FOR BUILDING TECHNOLOGY,

Kansas Univ., Lawrence. Center for Research.

Fred J. Stephenson. 15 Sep 65, 74p

Research supported by NBS. Report on a preliminary exploration of definition, classification, and application.

Descriptors: (*Buildings, Performance (Engineering)), (*Performance (Engineering), Structures), Construction, Classification, Specifications, Standards.

The objectives of the report are pursued in two parts. A general introduction to the subject is provided in Part I. A clarification of the meaning and implications of the performance orientation is followed by a list of definitions and a general discussion of applications and limitations. Also considered is the close relation of performance concepts with systems of construction. In Part II, conceptual tools for the use of performance statements are proposed. This includes diagramatic models of the construction processes, suggested general classifications, and a brief discussion of testing. The primary intent is to discuss the subject generally, without attempting to propose final solutions. The basic analysis provided by this report is intended merely to clarify the directions for actual implementation of performance standards in building technology.

PB-174 096 HC$3.00 MF$0.65

ANALYSIS OF THE NATIONAL BUILDING CODE OF CANADA,

Polytechnic Inst. of Brooklyn, N. Y. Dept. of Mechanical Engineering.

Clifford A. Wojan. 1 Mar 66, 46p

Contract NBS-CST-1354

Descriptors: (*Buildings, Canada), (*Coding, Buildings), Performance (Engineering), United States, Construction, Specifications, Standards, Subject indexing, Structures.

An analysis is made of the 1965 edition of the National Building Code of Canada comparing its requirements and format with the four principal United States 'national' codes. A study is made to determine whether the Canadian code is more performance type or more specification type than the four 'national' codes.

PB-174 097 HC$3.00 MF$0.65

COMPUTER - AIDED COST ESTIMATING TECHNIQUES FOR ARCHITECTS,

Massachusetts Inst. of Tech., Cambridge. Dept. of Architecture.

Theodore H. Myer, and Richard I. Krauss. 1966, 103p

Research supported by NBS.

Descriptors: (*Buildings, Costs), (*Costs, Computer programs), Construction, Budgets, Predictions, Cost effectiveness, Data storage systems, Information retrieval, Programming (Computers), Coding.

Identifiers: Architects.

The report is a contribution to a larger study concerning the ability of the computer to aid in the processes of design and construction. The primary concerns of this study have been to delineate the problems involved in performing cost estimates and to suggest approaches by which they might be solved if there were a general computer communication and calculation system available. Cost estimating in the building industry is a complex process involving numerous individuals with diverse interests; in this study the authors have focussed on the special needs of the architect and outlined an approach toward a computer based estimating system to meet his needs.

PB-174 098 HC$3.00 MF$0.65

14. METHODS AND EQUIPMENT

14A. COST EFFECTIVENESS

FAILURE RATE COMPUTATIONS BASED ON MARINER MARS 1964 SPACECRAFT DATA.

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
For primary bibliographic entry see Field 9A.
For abstract, see STAR 05 06.
N67-15684 HC$3.00 MF$0.65

14B. LABORATORIES, TEST FACILITIES, AND TEST EQUIPMENT

DEVICE FOR LOW-FREQUENCY PHOTOGRAPHY,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 14E.
AD-646 378 HC$3.00 MF$0.65

IR DETECTOR TEMPERATURE REGULATOR FOR CO VIBRALUMINESCENCE STUDIES.
Utah State Univ., Logan. Electro-Dynamics Labs.
For primary bibliographic entry see Field 20F.
AD-646 429 HC$3.00 MF$0.65

STABILIZATION OF A MAGNETIC FIELD BASED ON NUCLEAR RESONANCE,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 20C.
AD-646 454 HC$3.00 MF$0.65

DEVELOPMENT OF METHODS OF TESTING AGGREGATE LARGER THAN 1-1/2 INCH.
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 13C.
AD-646 502 MF$0.65

AN AUTOMATIC TESTING SYSTEM FOR TELEPHONE CABLES,
Finnish Cable Works Ltd., Helsinki. Technical Research Div.
For primary bibliographic entry see Field 17B.
AD-646 534 HC$3.00 MF$0.65

A HORIZONTAL MACHINE FOR TESTING STRUCTURAL WOOD ELEMENTS IN TENSION.
Research note,
Forest Products Lab., Madison, Wis.
K. H. Boller. Jan 67, 19p FPL-0150

Descriptors: (*Test equipment, *Wood), Tensile properties, Design.

The machine provides an efficient facility for conducting evaluations of tensile strength properties of structural size lumber relatively fast, easily, and safely. The grips provide axial alinement of clear material and rotate freely when eccentrically located knots are present. The hydraulic loading system provides a uniform, controllable velocity of the movable head, and the electronic weighing system provides an accurate measurement of the tensile load. The face width of the grips, the distance between faces, and the distance between the movable and the stationary grips are such that various structural specimens, ranging in size from 1 to 2 inches thick, 4 to 10 inches wide, and 8 to 16 feet long, can be tested provided the load does not exceed 150,000 pounds. The grips are wedge shaped and beveled to automatically lateral pressure against the specimen and yet minimize stress concentrations. An extensometer accurately provides an average measurement of strain in the specimen between the grips, permitting one observer to read and record the elongation. Finally, the entire work area in which the operators must handle the specimens and extensometer and observe data provides for efficient operation. All of these features aid in the accurate, safe, and economical generation of tensile properties of structural size members. (Author)
AD-646 564 HC$3.00 MF$0.65

INVESTIGATION OF RESONANT BEAM AND ULTRASONIC METHODS FOR THE EVALUATION OF SINTERED POWDER STEEL COMPACTS.
Springfield Armory, Mass.
For primary bibliographic entry see Field 11F.
AD-646 580 HC$3.00 MF$0.65

MEASUREMENT OF GAS DENSITY BY ELECTRON SCATTERING.
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
For primary bibliographic entry see Field 7D.
AD-646 590 HC$3.00 MF$0.65

A TECHNIQUE OF FABRICATING INHOMOGENEOUS MEDIA AND THE BEHAVIOR OF A DIPOLE IN SUCH A MEDIUM.
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
For primary bibliographic entry see Field 9E.
AD-646 592 HC$3.00 MF$0.65

ANALYTICAL STUDY OF SHOCK TUNNEL SIMULATION OF COMBUSTOR ENTRANCE CONDITIONS,
Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 21E.
AD-646 599 HC$3.00 MF$0.65

AN IMPROVED ANEMOMETER FOR LOW-LEVEL WINDS. PHASE I. DESIGN PLAN.
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 4B.
AD-646 605 HC$3.00 MF$0.65

ON THE USE OF THE RING TEST FOR DETERMINING RATE SENSITIVE MATERIAL CONSTANTS,
Catholic Univ. of America, Washington, D. C.
For primary bibliographic entry see Field 20K.
AD-646 609 HC$3.00 MF$0.65

A BEND METHOD FOR MEASURING FATIGUE CRACK PROPAGATION IN THICK MATERIALS.
Royal Aircraft Establishment, Farnborough (England).
For primary bibliographic entry see Field 20K.
AD-646 649 HC$3.00 MF$0.65

METHOD FOR EXTENSION OF DIELECTRIC CONSTANT AND LOSS MEASUREMENTS OF LIQUIDS TO 100 MHz WITH A FIXED-GEOMETRY SAMPLE HOLDER.
Harry Diamond Labs., Washington, D. C.
For primary bibliographic entry see Field 9C.
AD-646 655 HC$3.00 MF$0.65

HELICAL PATH ELECTROPHORESIS IN VERTICAL FLUID SHEATHS,
California Univ., Los Angeles. Dept. of Biophysics and Nuclear Medicine.
For primary bibliographic entry see Field 6A.
AD-646 689 Not available from CFSTI.

STANTON TUBE CALIBRATION IN A LAMINAR BOUNDARY LAYER AT MACH 6,
California Inst. of Tech., Pasadena.
For primary bibliographic entry see Field 20D.
AD-646 707 Not available from CFSTI.

PORTABLE INSTRUMENTATION LABORATORY (PORT-A-LAB).
Naval Ordnance Lab., White Oak, Md.
Luigi A. Vagnoni. 17 Nov 66, 16p NOL-TR-66-218

Descriptors: (*Laboratories, Portable), Laboratory equipment, Naval research laboratories, Weapons, Ordnance laboratories, Controlled atmospheres.

Described is a compact laboratory (Port-A-Lab) designed to be easily and quickly transported by pick-up truck, railroad, ship, or air freight for use at serviced or unserviced test sites. The Port-A-Lab contains hand and machine tools, and instrumentation to record, reproduce and analyze shock, vibration, and other environmental data in the field. The facility has been used to provide information of immediate interest in the development of new weapons and laboratory environment simulation equipment. (Author)
AD-646 714 HC$3.00 MF$0.65

THE DIFFERENTIATOR CIRCUIT.
Technical memo.,
Picatinny Arsenal, Dover, N. J. Ammunition Group.
Noble Lockhart. Nov 62, 20p
PA-TM-49-63

Descriptors: (*Differentiating circuits, Instrumentation), Weight, Calibration, Graphics, Recording systems, Temperature.

The modified equipment described in this report includes Aminco Thermo-Grav Equipment. The original system was designed to record a primary curve of weight = f (t), where t can be either temperature or time. This system includes a potentiometric type x-y recorder for plotting the relationship between an independent and a dependent variable. The primary thermograms obtained up to the present from this system consisted of differential weight as a function of temperature. An additional system was developed to provide curves of the derivative of primary thermograms. In the event that the curves closely approximated the rate of changes of the primary curve, the amplitude of the derivative could be used to determine maximum and minimum points of inflection and also other reaction kinetic indices of the primary thermogram. These data are used in the analysis of a chemical process wherein a definite change of weight occurs as a result of a temperature change. Simultaneous recording of the primary thermogram curve and derivative curve, using the temperature as a common abscissa, solicitates a comparison of the two curves. (Author)
AD-646 722 HC$3.00 MF$0.65

R AND D CLEAN OR PRODUCTION CLEAN,
Army Missile Command, Redstone Arsenal, Ala. Army Inertial Guidance and Control Lab.
Will Gibson. 20 Apr 66, 32p RGL-TN-2-66

Descriptors: (*Clean rooms, *Test facilities), (*Laboratories, Scientific research), Production, Industrial research, Research program administration, Test equipment, Guided missiles.
Identifiers: Research and development.

The basic requirements of a production oriented facility and an R and D facility are considerably different in many respects. Although the same 'building blocks' are used insofar as construction materials are concerned, the design layout and utilization of the facilities differ markedly. Not only are the material and personnel movements different, the training of the personnel is dissimilar. The relative advantages and disadvantages of both are discussed as well as the related construction costs. The importance of an R and D clean room is di-

rectly related to the potential profits that a company can earn in production. Top management is directly responsible. (Author)
AD-646 734 HC$3.00 MF$0.65

THE NOL BOUNDARY LAYER CHANNEL.
Naval Ordnance Lab., White Oak, Md.
Roland E. Lee, William J. Yanta, Annette C. Leonas, and John W. Carner. 7 Nov 66, 49p
NOLTR-66-185, Aerodynamics Research-270

Descriptors: (*Wind tunnels, *Boundary layer), Boundary layer transition, Turbulent boundary layer, Hypersonic wind tunnels, Supersonic wind tunnels, Supersonic nozzles, Reynolds number, Performance (Engineering), Design.

A Mach 3 to 7 blow-down wind tunnel facility for investigating boundary layer phenomena in the transitional and turbulent range is described. The facility, referred to as the Boundary Layer Channel, utilizes a flexible plate and a flat plate to form the two opposite walls of a two-dimensional supersonic nozzle. The plate is 8 feet long. The channel operates at supply temperatures up to 1000F and supply pressures from 0.1 to 10 atmospheres. The Reynolds number per foot capability is from 30,000 to 2.4 x 10 to the 7th power. (Author)
AD-646 748 HC$3.00 MF$0.65

THE AIR FORCE MATERIALS LABORATORY HYPERVELOCITY BALLISTIC RANGE.
Dayton Univ., Ohio. Research Inst.
For primary bibliographic entry see Field 19D.
AD-646 760 HC$3.00 MF$0.65

INTERNAL CONVECTION EFFECTS IN THERMAL MODELS OF SPACE VEHICLES.
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
For primary bibliographic entry see Field 22B.
AD-646 770 HC$3.00 MF$0.65

INTELLIGIBILITY TEST METHODS AND PROCEDURES FOR THE EVALUATION OF SPEECH COMMUNICATION SYSTEMS.
Bolt Beranek and Newman, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 17B.
AD-646 781 HC$3.00 MF$0.65

REPORT ON DEMOUNTABLE VACUUM SCANNER AND VACUUM SEALED CRYSTAL SPECIMENS FOR ELECTRONIC SCANNING.
ITT Industrial Labs., Fort Wayne, Ind.
For primary bibliographic entry see Field 20B.
AD-646 886 HC$3.00 MF$0.65

HYDROMECHANIC DESIGN OF A PROPOSED NEKTON SAMPLER.
David Taylor Model Basin, Washington, D. C. Hydromechanics Lab.
For primary bibliographic entry see Field 8A.
AD-646 892 HC$3.00 MF$0.65

TEMPERATURE CONTROL OF THE ORBITAL OTOLITH EXPERIMENT.
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
For primary bibliographic entry see Field 6K.
AD-646 921 HC$3.00 MF$0.65

A SURVEY OF IONIZATION VACUUM GAGES AND THEIR PERFORMANCE CHARACTERISTICS,
National Bureau of Standards, Washington, D. C. Inst. for Basic Standards.
W. G. Brombacher. 3 Feb 67, 68p
Hard copy available from Superintendent of Documents, GPO, Washington, 20402, D. C. HC$0.40.

Descriptors: (*Ionization gages, Reviews), (*Vacuum apparatus, Reviews), Design, Performance (Engineering), Calibration, Test equipment, Standards.

The design of various types of ionization gages is outlined, with particular attention to the design elements important to performance. The performance and the many factors affecting the performance of the various gages are reviewed. Methods of calibration are discussed in some detail, including the use of volumetric pressure dividers, conductance pressure dividers and constant rate of pressure change methods. About 365 references to the literature are cited. (Author)
NBS-TN-298 HC$0.40 MF$0.65

A NEW NEAR-ZONE ELECTRIC FIELD-STRENGTH METER.
Technical note,
National Bureau of Standards, Washington, D. C.
Frank M. Greene. 15 Nov 66, 53p
Hardcopy available from Superintendent of Documents, GPO, Washington, D. C. 20402 $0.35.

Descriptors: (*Measuring devices (Electrical + electronic), *Electric fields), Transmission lines, Telemeter systems, Design, Performance (Engineering).
Identifiers: Electric field strength.

The National Bureau of Standards has recently completed the development of prototype instrumentation for measuring the electric-field components of complex, high-level, near-zone electromagnetic fields from 0.1 to 1000 volts per meter, at frequencies from 150 kHz to 30 MHz with a present uncertainty of less than plus or minus 2 dB. The design of the NBS meters is based on the use of a novel form of telemetry, employing a completely non-metallic electrical transmission line, which apparently has not been fully exploited heretofore. This avoids the perturbing effects on the field being measured, usually caused by field-strength meters employing metallic RF transmission lines. The design and performance of the meter are discussed in some detail. (Author)
NBS-TN-345 HC$0.35 MF$0.65

INVESTIGATION OF THE FLOW PAST ELIPTICAL CONES.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 06.
N67-15559 HC$3.00 MF$0.65

STUDY OF HOT-CATHODE MAGNETRON ION GAUGE.
General Electric Co., Schenectady, N. Y.
W. D. Davis, L. J. Favreau, and J. M. Lafferty.
Jan 67, 32p NASA-CR-701
Contract NAS5-9229

Descriptors: *Hot cathode, *Ion gauge, *Magnetron, Analysis, Calibration, Cathode, Characteristics, Error, Fabrication, Flow, Gas, Gauge, Hot, Hydrogen, Ion, Mass, Measurement, Nitrogen, Operation, Oxygen, Performance, Pressure, Quadrupole, Spectrometer, Testing, Ultrahigh, Vacuum, Vibration.

For abstract, see STAR 05 06.
N67-15670 HC$3.00 MF$0.65

DEVELOPMENT OF A MASS SPECTROMETER SYSTEM SUMMARY TECHNICAL REPORT, 1 JUN. 1965 - 21 MAY 1966.
National Research Corp., Cambridge, Mass.
P. Blum, and F. L. Torney, Jr.. Nov 66, 43p
NASA-CR-66257
Contract NAS1-2691

Descriptors: *Cold cathode, *Ion source, *Magnetron, *Mass spectrometry, *Residual gas, *Ultrahigh vacuum, Analysis, Anode, Cathode, Characteristics, Cold, Frequency, Gas, Ion, Isotope, Magnet, Mass, Operation, Performance, Potential, Pressure, Quadrupole, Residual, Resolution, Retardation, Sensitivity, Source, Spectrometry, Ultrahigh, Vacuum.

For abstract, see STAR 05 06.
N67-15673 HC$3.00 MF$0.65

EFFECTS OF CONFIGURATION GEOMETRY ON THE SUPERSONIC AERODYNAMIC CHARACTERISTICS OF A SIMULATED LAUNCH VEHICLE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 06.
N67-15957 HC$3.00 MF$0.65

GROUND TEST FACILITIES FOR AIRCRAFT AIRBREATHING PROPULSION SYSTEM DEVELOPMENT.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
J. R. Esterly. 1967, 55p NASA-TM-X-52224
Presented At The Univ. Of Tenn. Space Inst., Tullahoma, Tenn., 31 Jan. - 10 Feb. 1967

Descriptors: *Air breathing engine, *Aircraft power source, *Ground test, Afterburner, Air, Aircraft, Bibliography, Breathing, Conference, Engine, Facility, Flow, Graph, Ground, Performance, Power, Ramjet, Reynolds number, Source, Test, Turbojet, Turboprop.

For abstract, see STAR 05 06.
N67-16041 HC$3.00 MF$0.65

ON CERTAIN TYPES OF SELF-EXCITED OSCILLATION OCCURRING WITH AIRCRAFT CONTROL SURFACES IN TRANSONIC FLOW.
National Physical Lab., Teddington (England). Aerodynamics Div.
For primary bibliographic entry see Field 1D.
For abstract, see STAR 05 06.
N67-16194 HC$3.00 MF$0.65

DIGITIZED SPARK CHAMBER FOR SPACE SCIENCE EXPERIMENTS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
C. H. Ehrmann, C. E. Fichtel, D. A. Kniffen, and R. W. Ross. Nov 66, 16p NASA-TM-X-55643, X-611-66-536

Descriptors: *Balloon sounding, *Charged particle, *Gamma radiation, *Radiation detector, *Spark chamber, Balloon, Chamber, Charge, Cosmic, Design, Detector, Digital, Gamma, Particle, Radiation, Satellite, Sounding, Space, Spark.

For abstract, see STAR 05 06.
N67-16546 HC$3.00 MF$0.65

TRANSIENT RADIATION EFFECTS ON THERMOCOUPLES.
Cincinnati Univ., Ohio.
For primary bibliographic entry see Field 18D.
For abstract, see STAR 05 06.
N67-16632 HC$3.00 MF$0.65

DEVELOPMENT AND APPLICATION OF A PHOTOELASTO- PLASTIC METHOD TO STUDY STRESS DISTRIBUTIONS IN VICINITY OF A SIMULATED CRACK.
Lockheed Aircraft Corp., Sunnyvale, Calif.
For primary bibliographic entry see Field 20K.

For abstract, see STAR 05 06.
N67-16663 HC$3.00 MF$0.65

THEORY OF ELECTROSTATIC PLANAR AND SPHERICAL PROBES.
Mount Auburn Research Associates, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 4A.
For abstract, see STAR 05 06.
N67-16671 HC$3.00 MF$0.65

EVALUATION OF A THIN-FILM, HEAT-FLUX PROBE FOR MEASURING GAS VELOCITIES IN AN UNSTABLE ROCKET COMBUSTOR.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 21B.
For abstract, see STAR 05 06.
N67-16678 HC$3.00 MF$0.65

POLYMERS FOR SPACECRAFT HARDWARE - MATERIALS CHARACTERIZATION, PART I INTERIM REPORT, MAR. - DEC. 1966.
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 06.
N67-16695 HC$3.00 MF$0.65

IMPEDANCE BRIDGE MODEL 1650-A (GENERAL RADIO).
Technical manual instrument calibration procedure, AZ-24.
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
1 Jan 67, 12p
NAVAIR-17-20AZ-24
Supersedes NAVWEPS 17-20AZ-24 dated 1 February 1966, PB-170 212.

Descriptors: (*Test equipment (Electronics), Calibration), (*Impedance bridges, Calibration), Frequency, Resistance (Electrical), Capacitance, Inductance, Test methods, Instruction manuals.
Identifiers: 1650 Impedance bridges.

This procedure describes the calibration of the General Radio 1650-A impedance bridge, referred to as the Test Instrument. This procedure was prepared by the Metrology Engineering Center, Pomona, California. All comments concerning this procedure should be directed to the Metrology Engineering Center.
PB-174 023 HC$3.00 MF$0.65

LIQUID HYDROGEN ENGINEERING INSTRUMENTATION.
National Bureau of Standards, Boulder, Colo. Cryogenics Div.
Thomas M. Flynn. 14 Sep 65, 43p
Liquid Hydrogen, International Institute of Refrigeration, Paris, France, p295-338 1965.

Descriptors: (*Cryogenics, Instrumentation), Liquefied gases, Pressure gages, Hydrogen, Flowmeters, Liquid level gages, Thermometers, Measurement.

Prudent liquid hydrogen engineering requires the measurement of both extensive and intensive properties of the cryogenic liquid. Transducers are required for liquid level (quantity), both point and continuous systems, and mass rate systems. In addition, there must be transducers of pressure, temperature, density, and occasionally, quality. This paper discusses some of the devices and practices currently used for the measurement of pressure, temperature, flow rate, and liquid level in liquid hydrogen systems. (Author)
PB-174 025 HC$3.00 MF$0.65

CINEMATOGRAPHIE DE PHENOMENES TRANSITOIRES FAIBLEMENT LUMINEUX A L'AIDE D'AMPLIFICATEURS DE LUMINANCE (Cinematography of Weakly-Luminous Transient Phenomena Using Image Converters),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
Pierre Stevenin, and Claude Jacquot. Nov 66, 22p
CEA-R-3097
Text in French, attached summary in English.

Descriptors: (*High-speed photography, Optical phenomena), (*Plasma medium, High-speed photography), (*Motion picture photography, Optical phenomena), Light pulses, Transients, Spectroscopy, Gas discharges, Emissivity, Optical instruments, Image converters, Gain, Resolution, France.

After a review on the physical of optical informations emitted by a light source of weak intensity and short duration, a description is given of a high gain device obtained by associating two image converters. Specifications are given in the domain of high speed cinematography and spectrometry. (Author)
PB-174 046 HC$3.00 MF$0.65

BASE-METAL THERMOCOUPLES (EXCEPT COPPER VS. CONSTANTAN) AMBIENT TO 1000 C.
Technical manual instrument calibration procedure, ST-01.
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
15 Nov 66, 21p
NAVAIR-17-20ST-01

Descriptors: (*Thermocouples, *Calibration), Instruction manuals, High-temperature research, Test methods.

The procedure describes the calibration of 'bare wire' base-metal thermocouples, excepi copper vs. constantan, which are temperature sensing devices.
PB-174 080 HC$3.00 MF$0.65

AC-DC METER CALIBRATOR MODEL 33 (RADIO FREQUENCY LABORATORIES, INC).
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
For primary bibliographic entry see Field 9C.
PB-174 081 HC$3.00 MF$0.65

WAVEGUIDE ATTENUATORS 2.60 TO 40.0 GHz 0 TO 50 DB.
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
For primary bibliographic entry see Field 9A.
PB-174 086 HC$3.00 MF$0.65

14C. RECORDING DEVICES

A PERIOD MODULATED CARRIER TECHNIQUE FOR DATA RECORDINGS.
Defence Research Telecommunications Establishment, Ottawa (Ontario).
M. A. Maclean. 1966, 6p
Availability: Published in IEEE Transactions on Aerospace and Electronic Systems (Suppl) vAES-2 n6 p119-24 Nov 1966.

Descriptors: (*Magnetic recording systems, Modulation), Data, Discriminators, Demodulation, Circuits, Digital systems, Signals.
Identifiers: Period modulation.

The data signal modulates the period of a carrier in a linear fashion to obtain the same benefits offered by FM tape recording. A discriminator for this type of modulation can have significantly less spurious output at the carrier and its second harmonic than pulse-counting FM discriminators. This may allow wider modulation bandwidth or simplify post-detection filtering. Digital techniques can be employed to yield a system with a very stable overall transfer function. (Author)
AD-646 824 Not available from CFSTI.

14D. RELIABILITY

RELIABLE COMPUTATION WITH UNRELIABLE ELEMENTS.
Imperial Coll. of Science and Technology, London (England). Dept. of Electrical Engineering.
For primary bibliographic entry see Field 9B.
AD-646 625 HC$3.00 MF$0.65

QUARTZ CRYSTAL AGING EFFECTS.
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
For primary bibliographic entry see Field 9A.
AD-646 737 HC$3.00 MF$0.65

PROJECT "DIODE RELIABILITY PREDICTION TECHNIQUE".
Hughes Aircraft Co., Culver City, Calif.
C. M. Ryerson. Feb 67, 87p NASA-CR-702
Contract NAS5-9638

Descriptors: *Component reliability, *Diode, *Failure, *Mathematical model, *Performance prediction, *Semiconductor device, Component, Degradation, Device, Equation, Mathematics, Model, Performance, Prediction, Rate, Reliability, Semiconductor, Stress.

For abstract, see STAR 05 06.
N67-16670 HC$3.00 MF$0.65

14E. REPROGRAPHY

WEATHER FACTORS AFFECTING AERIAL PHOTOGRAPHY AND OPERATIONS IN TANGANYIKA, UGANDA AND KENYA.
Weather Wing (7th), Scott AFB, Ill.
For primary bibliographic entry see Field 4B.
AD-646 356 HC$3.00 MF$0.65

WEATHER FACTORS AFFECTING AERIAL PHOTOGRAPHY AND OPERATIONS IN FRENCH SOMALILAND AND SOMALI REPUBLIC.
Weather Wing (7th), Scott AFB, Ill.
For primary bibliographic entry see Field 4B.
AD-646 357 HC$3.00 MF$0.65

DISPLAY SIMULATOR FOR COLORED-IMAGE PRESENTATION.
RAND Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 16D.
AD-646 365 HC$3.00 MF$0.65

DEVICE FOR LOW-FREQUENCY PHOTOGRAPHY.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
M. S. Shakirzyanov. 5 Dec 66, 7p FTD-HT-66-660
Unedited rough draft trans. of Patent (USSR) 160 846, appl. 829583/26-10, 8 Apr 63.

Descriptors: (*Photographic equipment, *Low frequency), Design, Chronographs, Camera shutters, Gears, Exposure meters.

A device for low-frequency photography on film moving at a constant speed is designed in the form of an attachment to the photographic apparatus. It has a distinguishing feature for improving the quality of the chronophotograms obtained. The attachment has a system of two or more shutters with the slowest shutter providing the necessary photographing frequency, and the fastest shutter

providing the shortest exposure time. Another device has a feature for turning the head of the photographic apparatus and the shutter system in that the head is connected by a flexible shaft to the multishutter attachment axis on which a system of gear transmissions providing different shutter speeds is mounted. (Author)
AD-646 378 HC$3.00 MF$0.65

SURVEY OF RESEARCH ON TYPOGRAPHICAL EFFECTIVENESS.
Summary rept. 12 Sep 58-12 Jun 59,
Washington Engineering Services Co., Inc., Kensington, Md.
E. K. Van Swearingen. 12 Jun 59, 69p
Contract NObs-76029

Descriptors: (*Printing, Effectiveness), Typewriters, Visibility, Reading, Physical properties, Background, Surface properties, Visual perception.

Research on the effects of typographical and environmental variables on effectiveness of printed materials is surveyed. Effectiveness is defined as ease and accuracy of reading words, phrases, connected text, and numerals in context. Variables considered are: (1) type style or design; (2) interactions of charcter size, length of line, and interlinear spacing; (3) form of type; (4) mixtures of different forms, styles, and compositions; (5) size of margins and inter-column spaces; (6) distance to reader; (7) levels of illumination; (8) background vs. character surface reflectances; (9) background vs. character colors; (10) curvature of surface; (11) angular alignment of printed surface to line of sight; (12) angular alignment of lines of type to line of sight; (13) vibration; (14) prediction and measurement of 'comprehensibility'. (Author)
AD-646 437 HC$3.00 MF$0.65

DETERMINATION OF THE PATTERN OF ISOTHERMS IN A METAL CUTTING TOOL USING INFRA RED PHOTOGRAPHY,
Queen's Univ., Kingston (Ontario). Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 13I.
AD-646 811 Not available from CFSTI.

EXPOSURE PREDICTIONS FOR GEODETIC SATELLITE PHOTOGRAPHY BY STELLAR PHOTOMETRY,
EG and G, Inc., Bedford, Mass.
For primary bibliographic entry see Field 22D.
AD-646 878 HC$3.00 MF$0.65

COMMUNICATIONS OF THE LUNAR AND PLANETARY LABORATORY, NOS. 58-59.
Arizona Univ., Tucson.
For primary bibliographic entry see Field 3A.
For abstract, see STAR 05 06.
N67-15400 HC$3.00 MF$0.65

CINEMATOGRAPHIE DE PHENOMENES TRANSITOIRES FAIBLEMENT LUMINEUX A L'AIDE D'AMPLIFICATEURS DE LUMINANCE (Cinematography of Weakly-Luminous Transient Phenomena Using Image Converters),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 14B.
PB-174 046 HC$3.00 MF$0.65

15. MILITARY SCIENCES

15B. CHEMICAL, BIOLOGICAL, AND RADIOLOGICAL WARFARE

CBE FACTORS: MONTHLY SURVEY NO. 12.
Aerospace Technology Div., Library of Congress, Washington, D. C.
30 Jun 64, 191p ATD-66-142
TT-67-60988
Survey series on Chemical, Biological, and Environmental Factors. See also AD-644 464.

Descriptors: (*Chemical warfare agents, Reviews), (*Biological warfare agents, Reviews), (*Environment, Reviews), Pesticides, Herbicides, Fertilizers, Hallucinogens, Epidemiology, Viruses, Toxicity, Aerosols, Ecology, Soils, Wind, Atmospheric motion, Atmospheric precipitation, Micrometeorology, USSR.

The monthly survey is based on Communist World open sources. It is the twelfth in a series of monthly surveys covering the following areas: I. Chemical factors (pesticides, herbicides, fertilizers, psychotomimetics, other chemicals); II. Biological factors (pathogens); III. Environmental factors (aerosols, ecology, micrometeorology, soil science). An author index and lists of authors' organizations and sources cited are included in Appendixes 1-3, respectively. There is no bibliography. Available translations of additional sources related to the biological factors area are listed. (Author)
AD-646 899 HC$3.00 MF$0.65

15C. DEFENSE

THE ARRANGEMENT OF CIC EQUIPMENT ON A CVL. (SHIPBOARD SYSTEMS STUDIES).
Dunlap and Associates, Inc., Stamford, Conn.
For primary bibliographic entry see Field 13J.
AD-646 615 MF$0.65

AN APPROACH TO DEFINING POSTATTACK RECOVERY MANAGEMENT CONCEPTS AND TECHNIQUES,
Stanford Research Inst., Menlo Park, Calif.
Donald E. Clark, Jr., Carl F. Miller, and George I. Hopkins. Nov 66, 62p
Contract OCD-OS-63-149

Descriptors: (*Nuclear explosion damage, Countermeasures), (*Countermeasures, Management engineering), Manpower studies, Cost effectiveness, Management planning, Recovery, Survival, Environment, Management control systems, Civil defense systems.

Potential postattack countermeasures, under the six general categories of protective, radiological, medical, ecological, economic, and social, are listed and discussed briefly. A functional approach to the development of postattack recovery management techniques based on current knowledge is suggested, and present developmental limitations are indicated. (Author)
AD-646 627 HC$3.00 MF$0.65

IN-HOUSE R AND D IN NATIONAL DEFENSE.
Management analysis memo.,
Office of the Director of Defense Research and Engineering, Washington, D. C.
John S. Foster, Jr. 27 Sep 66, 8p ODDRE-MAM-66-2-Suppl-2
Presented at the Annual Air Force Science and Engineering Symposium (13th), Arnold Engineering Development Center, Tenn., 27 Sep 1966.

Descriptors: (*Defense systems, *Air Force research), Weapon systems, Scientific research, Aircraft, Combat readiness, Naval personnel.
Identifiers: Resenrch and development.

A brief discussion is presented of some of the problems that face Air Force research teams.
AD-646 736 HC$3.00 MF$0.65

METHODS OF SHELTER COST ANALYSIS.
Hayes, Seay, Mattern and Mattern, Roanoke, Va.
For primary bibliographic entry see Field 13M.
AD-646 847 HC$3.00 MF$0.65

15E. LOGISTICS

THE BASE MAINTENANCE-OPERATIONS MODEL USED IN RAND LOGISTICS RESEARCH.
Research memo.,
RAND Corp., Santa Monica, Calif.
R. A. Levine, and R. B. Rainey. 4 May 59, 43p
RM-2374
Contract AF 33 (038)-6413

Descriptors: (*Logistics, Air force operations), (*Aircraft, Maintenance), Operations research, Maintenance personnel, Combat readiness.

The memorandum presents a non-mathematical explanation of the model which RAND's Logistics Department uses in studying the interaction of aircraft operations and base-level logistics, particularly direct maintenance. In measuring the effects of Air Force maintenance and operations policies, the model improves upon past methods by using Air Force data of two sorts: fixed numbers, such as the number of planes in a squadron, the number of personnel in a squadron, etc.; and probability distributions, such as the distribution of times needed to repair a jet engine. From the probability distributions, random-number draws reproduce real-world events which happen in random patterns. The principal draws determine (1) whether or not a malfunction occurs on an aircraft, (2) the kind of malfunction and thus the maintenance skill-type demanded, and (3) the time it will take to correct the malfunction. (For example, a random draw may determine that two hours are to be spent in engine repair at a particular time.) In this way, the model simulates the random nature of real-world maintenance and operations events, and produces data from which credible short-range predictions of the behavior of random phenomena become possible; in turn, these predictions enable reasonably accurate estimates of the effects of proper manning and of the immediate effects of policy changes. (Author)
AD-220 605 HC$3.00

PROTECTIVE STRUCTURES AND COMPONENTS: COMPILATION OF ABSTRACTS.
Library of Congress, Washington, D. C. Aerospace Technology Div.
For primary bibliographic entry see Field 5A.
AD-646 390 HC$3.00 MF$0.65

THE STATUS OF MATHEMATICAL INVENTORY THEORY.
Stanford Univ., Calif. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 12B.
AD-646 403 Not available from CFSTI.

OPTIMAL POLICY FOR A DYNAMIC MULTI-ECHELON INVENTORY MODEL,
Decision Studies Group., Palo Alto, Calif.
Stuart A. Bessler, and Arthur F. Veinott, Jr. 1966, 36p
Contract Nonr-4457 (00)
Prepared in cooperation with Stanford Univ., Calif., Contract Nonr-225 (77).
Availability: Published in Naval Research Logistics Quarterly v13 n4 p355-89 Dec 1966.

Descriptors: (*Inventory analysis, Mathematical models), Optimization, Replacement theory, Procurement, Costs, Stock level control, Storage, Transportation.

A general multiperiod multi-echelon supply system consisting of n facilities each stocking a single product is studied. At the beginning of a period each facility may order stock from an exogeneous

source with no delivery lag and proportional ordering costs. During the period the (random) demands at the facilities are satisfied according to a given supply policy that determines to what extent stock may be redistributed from facilities with excess stock to those experiencing shortages. There are storage, shortage, and transportation costs. An ordering policy that minimizes expected costs is sought. If the initial stock is sufficiently small and certain other conditions are fulfilled, it is optimal to order up to a certain base stock level at each facility. The special supply policy in which each facility except facility 1 passes its shortages on to a given lower numbered facility called its direct supplier is examined in some detail. Bounds on the base stock levels are obtained. It is also shown that if the demand distribution at facility j is stochastically smaller ('spread' less) than that at another facility k having the same direct supplier and if certain other conditions are fulfilled, then the optimal base stock level ('virtual' stock out probability) at j is less than (greater than) or equal to that at facility k. (Author)
AD-646 438 Not available from CFSTI.

FINDING A CYCLE IN A GRAPH WITH MINIMUM COST TO TIME RATIO WITH APPLICATION TO A SHIP ROUTING PROBLEM.
Stanford Univ., Calif. Operations Research House.
For primary bibliographic entry see Field 12B.
AD-646 553 HC$3.00 MF$0.65

MANAGEMENT OF CONTRACTOR DATA AND REPORTS. VOLUME II: AUTHORIZED DATA LIST.
Air Force Systems Command, Washington, D. C.
For primary bibliographic entry see Field 5B.
PB-172 870-G HC$3.00

15F. NUCLEAR WARFARE

EQUATIONS AND COMPUTER PROGRAM TO CALCULATE THE THERMAL HISTORY OF A DUAL-LAYERED PLATE SUBJECT TO THE THERMAL PULSE OF A NUCLEAR WEAPON.
Naval Applied Science Lab., Brooklyn, N. Y.
For primary bibliographic entry see Field 13J.
AD-646 858 Not available from CFSTI.

16. MISSILE TECHNOLOGY

HEARING,
Johns Hopkins Univ., Baltimore, Md. Psychological Lab.
For primary bibliographic entry see Field 5J.
AD-646 812 Not available from CFSTI.

16A. MISSILE LAUNCHING AND GROUND SUPPORT

STUDY OF PIECE PART FAULT ISOLATION BY COMPUTER LOGIC.
Final rept., 15 Sep 59-30 Jun 60,
Pennsylvania Univ., Philadelphia. Inst. for Cooperative Research.
C. Beckman, R. Berkowitz, N. Prywes, and N. Puri. 30 Jun 60, 197p
Contract DA-36-034-507-ORD-3037
Prepared in cooperation with Pennsylvania Univ., Philadelphia. Moore School of Electrical Engineering.

Descriptors: (*Computer logic, *Checkout procedures), (*Checkout equipment, Guided missile components), Automatic, Digital computers, State-of-the-art reviews, Maintenance.
Identifiers: Fault isolation.

The concept of a digital computer controlled automatic checkout system and its economic and tactical justification are discussed. Four representative chassis were analyzed and test routines were developed. The concept of Network Element Value Solvability is introduced and mathematically defined. Error analysis of network element value solutions is discussed. The characteristics for an advanced computer controlled checkout system are presented. A study of the work going on in the artificial intelligence area was made. The relationship of artificial intelligence methods to the automatic checkout field is shown. (Author)
AD-646 358 HC$3.00 MF$0.65

PROTECTIVE STRUCTURES AND COMPONENTS: COMPILATION OF ABSTRACTS.
Library of Congress, Washington, D. C. Aerospace Technology Div.
For primary bibliographic entry see Field 5A.
AD-646 390 HC$3.00 MF$0.65

PHYSICAL BASES OF ROCKET WEAPONRY,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 19G.
AD-646 517 HC$3.00 MF$0.65

PRELAUNCH CHECKOUT IN THE 1970'S,
RAND Corp., Santa Monica, Calif.
L. T. Mast. Jan 67, 10p P-3518

Descriptors: (*Checkout procedures, Automation), Predictions, Checkout equipment, Launching sites, Miniature electronic equipment, Sensors, Telemeter systems, Performance (Engineering), Computers, Man-machine systems, Failure (Electronics), Systems engineering.

The paper attempts to predict the prelaunch environment of space launches in the 1970s. The author projects the major changes likely to occur in vehicle subsystems, prelaunch requirements, and launch site technology from those we know today, and attempts to create a picture of that future launch environment.
AD-646 600 HC$3.00 MF$0.65

16B. MISSILE TRAJECTORIES

THE FIELD-EDITING TECHNIQUE FOR SCIENTIFIC REPORTS,
White Sands Missile Range, N. Mex.
Elmer T. Canavin. Jan 56, 25p

Descriptors: (*Reports, Preparation), Data, Time studies.

The report presents a technique of manuscript preparation for technical reports that is of greater time and economy value than other methods. It was concluded from a series of tests conducted at White Sands Proving Ground (WSPG) that this technique is essential for prompt guided-missile technical-information movement to interested agencies. (Author)
AD-81 151 HC$3.00

16D. MISSILES

DISPLAY SIMULATOR FOR COLORED-IMAGE PRESENTATION,
RAND Corp., Santa Monica, Calif.
R. H. Stratton. Dec 66, 91p RM-5015-ARPA
Contract SD-79, ARPA Order-189-1

Descriptors: (*Guided missile defense systems, Display systems), (*Guided missile simulators, Optical images), Visual perception, Color vision, Visual acuity, Color photography, Motion picture photography, Viewing screens, Brightness, Real time, Color film.

In connection with a study dealing with human discrimination possibilities in missile defense discrimination, it was decided to test the ability of human observers to discriminate color differences among widely spaced moving images. Before these color discrimination tests were conducted, it was necessary to develop the equipment for such visual presentations. Several approaches to the design of this equipment were considered, and it was decided to use motion picture color photography, which seemed to be the most expedient method that satisfied the requirements of the discrimination tests. Equipment was developed to produce colored images on motion picture film by photographing a light source through several combinations of filters. Before an animation was filmed, the motion picture film was calibrated for color rendition, making it possible to produce the desired color on each film frame by means of different filter settings. The display simulator provides the multiple images required for the discrimination tests, and permits close control over image parameters such as color and position.
AD-646 365 HC$3.00 MF$0.65

PHYSICAL BASES OF ROCKET WEAPONRY,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 19G.
AD-646 517 HC$3.00 MF$0.65

SOLUTION OF THE EQUATION OF MOTION FOR FORCED TRANSVERSE VIBRATION OF A SLENDER BEAM WITH VISCOUS DAMPING,
Picatinny Arsenal, Dover, N. J. Feltman Research Labs.
William B. Deem. Jan 67, 45p
PA-TR-3490

Descriptors: (*Guided missiles, Vibration), (*Beams (Structural), Vibration), Equations of motion, Damping, Viscosity, Programming (Computers), Stresses, Slender bodies.

The equation of motion for the forced transverse vibration of a slender elastic beam with viscous damping is programmed for computer solution. The method of variation of parameters is used in the numerical solution of the equation of motion, giving the deflections due to each transverse mode of vibration. Stresses within the beam can be calculated in order to verify its structural integrity. The report is published to provide a handy and detailed solution to the forced vibration problem; however no priority in method of solution is claimed. The computer program is written in FORTRAN H for use on any IBM 360 computer. (Author)
AD-646 633 HC$3.00 MF$0.65

R AND D CLEAN OR PRODUCTION CLEAN,
Army Missile Command, Redstone Arsenal, Ala. Army Inertial Guidance and Control Lab.
For primary bibliographic entry see Field 14B.
AD-646 734 HC$3.00 MF$0.65

17. NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES

17A. ACOUSTIC DETECTION

ACOUSTIC DISTANCE MEASURING EQUIPMENT FOR RADIATED NOISE MEASUREMENTS,

Naval Research Lab., Washington, D. C.
W. C. Diehl, and N. H. Dale. Aug 66, 53p NRL Instruction Book-52

Descriptors: (*Underwater sound equipment, *Distance-measuring equipment), Electronic recording systems, Echo ranging, Noise, Transponders.

The Acoustic Distance Equipment (DME) system is an underwater acoustical range measuring system using a stationary echo ranger plus recorder and a transponder. The transponder is mounted on the submerged vessel to which the range is desired. The echo ranger plus recorder, termed DME recorder, initiates the sequence of operation by transmitting a pulsed signal to the transponder, which after reception and processing transmits its own signal back to the DME recorder. The recorder marks its own time of transmission and the time of reception from the transponder on a calibrated paper. In this manner one is able to determine the distance from the stationary DME recorder to the movable transponder on the vessel. The equipment is described in this instruction manual with specifications, electrical drawings, waveform pictures, and tabulation of various voltages supplied.
AD-646 496 HC$3.00 MF$0.65

GENERATION OF TWO-DIMENSIONAL OPTICAL SPATIAL AUTO- AND CROSS-CORRELATION FUNCTIONS,
Navy Underwater Sound Lab., New London, Conn.
For primary bibliographic entry see Field 9D.
AD-646 554 HC$3.00 MF$0.65

HYDRODYNAMIC ANALYSIS OF THE AN/SSQ-41 SONOBUOY HYDROPHONE SUSPENSION SYSTEM.
Final rept.,
Naval Air Development Center, Johnsville, Pa. Aero-Electronic Technology Dept.
J. Dale. 16 Jan 67, 34p NADC-AE-6636

Descriptors: (*Hydrophones, Suspension devices), (*Radio sono buoys, Fluid dynamic properties), Performance (Engineering), Hydrodynamics. Identifiers: AN/SSQ-41.

The response of the AN/SSQ-41 line hydrophone suspension to surface wave-induced and to flow-induced motions is reported, and the effects are shown to cause spurious audio sonobuoy signals. A wave-forced response analysis and the results of a sea trial verification are presented. Geometry of the suspension system is defined for horizontal flows to 1.5 knots, and recommendations are made for improved operational design. (Author)
AD-646 715 HC$3.00 MF$0.65

SOUND-RECEPTION AND FLOW-NOISE OF SIMPLE LINES AND PERFORATED PIPES IN MOTION.
Final rept.,
Raytheon Co., Bedford, Mass. Missile Systems Div.
Ewald Eichler. 31 Jan 67, 68p BR-4073
Contract N00014-66-C-0013

Descriptors: (*Acoustic detectors, *Noise), Fluid flow, Pipes, Motion, Sound, Control, Turbulent boundary layer, Sensors, Pressure, Mathematical models, Microphones, Propagation.

Extended acoustic receivers that sample a pressure-field by means of a simple propagating wave and their realization in the form of a microphone-terminated perforated pipe are studied. Motion through the medium subjects a receiver to apparent changes of frequency, to loss of surface reactance, and to flow-noise. It is found that at subsonic velocities the receiver-gain generally decreases with increasing velocity. In the perforated pipe, the phase-speed of sound can exceed the speed of sound in the free medium; true end-fire reception, at least at one frequency, becomes possible through the Doppler-effect. The flow-noise for a number of receiver-lengths and axial velocities is calculated on the basis of several models of the homogeneous and inhomogeneous turbulent boundary-layer pressurefield. The experimental flow-noise, whether obtained in the wind-tunnel or in free-fall through the atmosphere, lies generally higher. (Author)
AD-646 861 HC$3.00 MF$0.65

17B. COMMUNICATIONS

EFFICIENT CODING OF VOCODER CHANNEL SIGNALS USING LINEAR TRANSFORMATION.
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
For primary bibliographic entry see Field 9D.
AD-646 471 Not available from CFSTI.

MOISTURE PERMEATION AND ITS EFFECT ON COMMUNICATION CABLE,
Bell Telephone Labs., Murray Hill, N. J.
H. W. Friesen, and A. S. Windeler. 1966, 35p
Prepared for presentation at the Annual Wire and Cable Symposium (15th), Atlantic City, N. J., 7 Dec 1966.

Descriptors: (*Telephone lines, Moisture), Plastic coatings, Permeability, Water, Underground, Electrical properties, Polyethylene plastics, Electric insulation, Transmission lines.

The paper covers certain aspects of the problem of water in buried telephone cables. In the first part of the paper the permeation of water vapor through plastic sheath is discussed and the concept of the permeation time constant is introduced. A permeation pumping mechanism which can accumulate significant amounts of liquid water in buried cables is described. This mechanism depends on air flow rate and temperature changes in pressurized cables. In the second part of the paper the effects of small amounts of water on the capacitance and conductance of polyethylene insulated cable at voice and carrier frequencies are reported. In addition, some estimates are given of the likelihood of conductor cutoff by electrochemical corrosion in wet PIC cable. Finally, the problem of the junction of pressurized PIC and pulp cables is considered and the effect of humid air from the PIC cable on the electrical properties of the pulp cable are reported. (Author)
AD-646 528 HC$3.00 MF$0.65

AN AUTOMATIC TESTING SYSTEM FOR TELEPHONE CABLES,
Finnish Cable Works Ltd., Helsinki. Technical Research Div.
Erkki Ripatti, and Henry Hofheimer. 1966, 15p
Presented at Annual Wire and Cable Symposium (15th), Atlantic City, N. J., Dec 7-9, 1966. Prepared in cooperation with Cable Consultants Corp., Larchmont, N. Y.

Descriptors: (*Telephone lines, *Test sets), Electric cables, Automatic, Test equipment, Finland.

The PS 6800 is an advanced type of automatic test equipment whose output is adapted for electronic data processing. While it can be used at intermediate steps during the manufacture of the cable, its greatest benefits are derived after the completion of the cable. Its rapid operation permits an increased amount of testing per unit of time over conventional methods. Its adaptation to data storage and electronic data processing results in vastly increased records of statistical data. As a side benefit, a printed test report for each cable is readily available to submit to the customer. The additional statistical data gathered are, in turn, applied to tighter quality control and quality improvement studies, thus guiding the cable manufacturer in his never-ending aim for optimizing his product. (Author)
AD-646 534 HC$3.00 MF$0.65

THE EVOLUTION OF SHEATH CONSTRUCTIONS FOR COMMUNICATIONS CABLES,
Dow Chemical Co., Midland, Mich. Plastics Dept.
For primary bibliographic entry see Field 9A.
AD-646 537 HC$3.00 MF$0.65

APPLICATION OF WELDED THIN METAL IN NEW COMMUNICATION CABLE DESIGNS,
Canada Wire and Cable Co. Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 9A.
AD-646 538 HC$3.00 MF$0.65

DESIGN AND MANUFACTURE OF PLASTIC INSULATED ALUMINUM CONDUCTOR TELEPHONE CABLE,
Bell Telephone Labs., Baltimore, Md.
Frank W. Horn, and Warren E. Bleinberger. 1966, 30p
Presented at Annual Wire and Cable Symposium (15th), Atlantic City, N. J., Dec 7-9, 1966.
Prepared in cooperation with Western Electric Co., Baltimore, Md.

Descriptors: (*Telephone lines, Aluminum), Electric cables, Electric insulation, Plastic coatings, Manufacturing methods, Design, Barrier coatings, Drawing (Machine processing), Annealing, Installation.

The paper reports on a development project for the express purpose of finding a substitute for copper for exchange area telephone cable. It was realized from the beginning that just designing and developing methods and procedures for manufacturing aluminum conductor cable would not be a solution. A complete package must be available. Besides cable manufacture, studies were made of how to install the cable, splice the conductors, terminate the conductors, join cable lengths together, locate and repair trouble, always using suitable mitigating techniques to keep the ogre 'corrosion' from destroying the project.
AD-646 541 HC$3.00 MF$0.65

NEW COATING PROCESS FOR FOAMED POLYETHYLENE INSULATED TELEPHONE CABLE,
Sumitomo Electric Industries Ltd., Yokohama (Japan).
M. Sugi, C. Kawazoe, T. Ichiba, T. Suzuki, and H. Shinba. 1966, 6p
Prepared for presentation at Annual Wire and Cable Symposium (15th), Atlantic City, N. J., Dec 7-9, 1966.

Descriptors: (*Telephone lines, Plastic coatings), Japan, Expanded plastics, Polyethylene plastics, Electric insulation, Manufacturing methods, Density.

This article describes a newly developed high speed coating process for producing foamed high density polyethylene insulated fine gage conductors for use in exchange cables. (Author)
AD-646 542 HC$3.00 MF$0.65

PROTECTION OF TELEPHONE CABLES FROM ATTACK BY INSECTS,
Postmaster-General's Dept., Melbourne (Australia). Physics and Polymer Group.
G. Flatau. 1966, 19p
Presented at Annual Wire and Cable Symposium (15th), Atlantic City, N. J., Dec 7-9, 1966.

Descriptors: (*Telephone lines, Barrier coatings), (*Barrier coatings, Insect repellents), Effective-

ness, Electric cables, Coatings, Metal coatings, Plastic coatings, Rubber coatings, Australia.

As a result of the testing carried out in Australia over the past 15-20 years, an attempt was made to classify cable sheathing materials into four groups, as far as their resistance to insect attack is concerned: (a) Fully resistant materials: steel, brass, copper, aluminum, bronze, polycarbonate, acetals. (b) Highly resistant materials: rigid P.V.C., high density polythene, nylon, PTFE, polyesters. (c) Moderately resistant materials: lead, polypropylene, polyurethane, some natural rubbers, A.B.S. (d) Non-resistant materials: low density polythene, plasticised PVC cellulose acetate butyrate, synthetic rubbers. No general solution for the protection of telephone cables from insects is yet in existence, but present knowledge is now far enough advanced to be able to specify cable sheathing materials which will stand an excellent change of resisting attack under the most hazardous conditions. The final selection will usually be a compromise between economic and performance factors, and hence a knowledge of the probability of attack in a given area is required, when such decisions are to be made.
AD-646 543 HC$3.00 MF$0.65

RESPONSE OF A BURIED PROTOTYPE COMMUNICATIONS CONDUIT TO STATIC AND DYNAMIC LOADING.
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 13K.
AD-646 608 MF$0.65

FREQUENCY ASSIGNMENT STUDIES.
Quarterly progress rept. no. 4, 1 Aug-31 Oct 66,
Electro Technical Analysis Corp., Tucson, Ariz.
A. J. Hoehn, and T. W. McCurnin. Dec 66, 58p
ECOM-01232-4
Contract DA-28-043-AMC-01232 (E)
See also AD-636 592.

Descriptors: (*Radiofrequency, Scheduling), (*Electromagnetic compatibility, Radio communication systems), (*Radio communication systems, Tactical warfare), Frequency, Military requirements, Mathematical models, Radio receivers, Networks, Stochastic processes.

A study was made to improve electromagnetic compatibility in the field army through development of frequency-assignment practices. A modeling method for fm receivers is presented which takes into account the action of the demodulator, and which permits consideration of modulation of all signals. Modulation is in the form of random noise, which is a reasonably good approximation to voice signals and also to the signals resulting from multichannel, multiplexed telephone transmissions of the radio-relay type.
AD-646 613 HC$3.00 MF$0.65

STUDIES OF DISPLAY SYMBOL LEGIBILITY. PART XII. THE LEGIBILITY OF ALPHANUMERIC SYMBOLS FOR DIGITALIZED TELEVISION.
Mitre Corp., Bedford, Mass.
For primary bibliographic entry see Field 5H.
AD-646 660 HC$3.00 MF$0.65

WEATHER INFORMATION REMOTING AND DISPLAY SYSTEM.
Final rept.,
Westinghouse Electric Corp., Baltimore, Md.
M. J. Spangler. Aug 66, 73p
FAA-RD-66-85
Contract FA-64-WA-5256

Descriptors: (*Weather communications, *Air traffic control systems), Display systems, Weather, All-weather aviation, Meteorological radar, Data processing systems.

The object of the program was to design, develop, fabricate, test and check out a complete Weather Information Remoting and Display System (WIRDS) which will provide the capability of presenting current weather information in a form suitable for an air traffic controller to direct aircraft around hazardous weather phenomena. An experimental system was developed and placed in operation. This system provides a means for compiling data at the weather forecasting site from either a weather radar or other data sources, transferring this information to remote locations via a narrow bandwidth communication facility and converting it to a format suitable for insertion onto the Air Traffic Controller's radar display (RBDE-5). (Author)
AD-646 766 HC$3.00 MF$0.65

ANALYSIS AND SIMULATION OF WORD-SELECTION PROCEDURES IN ERROR-FREE COMMUNICATION SYSTEMS. PART I. COMPUTER PROGRAMS AND MATHEMATICAL THEORY.
New York Univ., N. Y. Lab. for Electroscience Research.
For primary bibliographic entry see Field 9D.
AD-646 780 HC$3.00 MF$0.65

INTELLIGIBILITY TEST METHODS AND PROCEDURES FOR THE EVALUATION OF SPEECH COMMUNICATION SYSTEMS.
Final rept.,
Bolt Beranek and Newman, Inc., Cambridge, Mass.
Carl E. Williams, Michael H. L. Hecker, Kenneth N. Stevens, and Barbara Woods. Dec 66, 65p
BBN-1442
ESD-TR-66-677
Contract AF 19 (628)-5659
See also AD-611 767.

Descriptors: (*Voice communication systems, Test methods), (*Intelligibility, *Speech), Psychoacoustics, Verbal behavior, Human engineering, Tests, Distortion.
Identifiers: Modified rhyme test.

In further exploring the Modified Rhyme Test (MRT), a recently developed intelligibility test designed for the evaluation of speech communication systems under operational military conditions, research has been conducted in the following areas: (a) the relation between MRT scores and other intelligibility test scores for various types and levels of speech distortion; (b) the influence of the closed-response format and listening experience on MRT scores; and (c) speaker intelligibility and the selection of speakers for recording the test lists. The present report describes the work undertaken in each of these areas. The ultimate objective of the work is the development of valid procedures for the efficient evaluation of speech communication systems. The major experimental results demonstrate that (1) the relation between scores obtained with different intelligibility test materials is not unique but depends considerably on the type of speech distortion employed, (2) neither the closed-response format nor prior listening experience appreciably affects MRT scores, and (3) less intelligible speakers tend to be those whose voiceless consonants are generated with lower intensity, particularly in word-final position. (Author)
AD-646 781 HC$3.00 MF$0.65

CONTINUOUS FACSIMILE SCANNER EMPLOYING FIBER OPTICS.
Quarterly progress rept. no. 9, 1 Jul-30 Sep 66,
IIT Research Inst., Chicago, Ill. Technology Center.
Donald A. Pontarelli. Jan 67, 14p IITRI-A6093-27
ECOM-00164-9
Contract DA-28-043-AMC-00164 (E)
See also AD-644 963.

Descriptors: (*Facsimile equipment, *Fiber optics), (*Optical scanning, Fiber optics), Modulators, Circuits, Performance (Engineering), Optical images, Electrical properties, Optical equipment components, Embedding substances, Facsimile transmission.

The objectives of the program are the design and construction of an advanced development model of a continuous facsimile transmitter employing a fiber optics scanner. The performance of the modulator circuit was evaluated and the black-to-white ratio was determined for different lamp and modulator voltage levels. Pertinent design features of the prototype scanner are presented and discussed. (Author)
AD-646 856 HC$3.00 MF$0.65

TECHNICAL EVALUATION OF EIDOPHOR.
National Aviation Facilities Experimental Center, Atlantic City, N. J.
For primary bibliographic entry see Field 17G.
AD-646 913 HC$3.00 MF$0.65

BEAM ALIGNMENT TECHNIQUES BASED ON THE CURRENT MULTIPLICATION EFFECT IN PHOTOCONDUCTORS SUMMARY TECHNICAL PROGRESS REPORT.
General Precision, Inc., Little Falls, N. J. Aerospace Research Center.
R. P. Borkowski, R. Carvalho, D. Grafstein, A. H. Samuel, and J. C. Scandon. Nov 66, 82p
NASA-CR-80004, STPR-2
Contract NAS12-8

Descriptors: *Photoconductor, *Spacecraft communications system, Alignment, Application, Beam, Breadboard, Charge, Communications, Computer program, Current, Design, Fortran, Mathematical model, Measurement, Spacecraft, System, Technique.

For abstract, see STAR 05 06.
N67-16054 HC$3.00 MF$0.65

PHASE I REPORT ON DEVELOPMENT OF A LOW-NOISE 8 MM RECEIVER FRONT END.
Trg, Inc., Melville, N. Y.
For primary bibliographic entry see Field 9A.
For abstract, see STAR 05 06.
N67-16635 HC$3.00 MF$0.65

A SPACE COMMUNICATIONS STUDY FINAL REPORT, SEP. 15, 1965 - SEP. 15, 1966.
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Electrical Engineering.
K. K. Clarke, R. L. Pickholtz, and D. L. Schilling.
15 Sep 66, 164p NASA-CR-81379
Contract NGR-33-006-020

Descriptors: *Channel, *Frequency modulation, *Signal reception, *Space communication, Analog, Circuit, Communication, Computer, Digital, Frequency, Loop, Modulation, Phase, Random, Receiver, Reception, Signal, Space, Transmitter.

For abstract, see STAR 05 06.
N67-16698 HC$3.00 MF$0.65

SHIP'S BRIDGE CONTROL CONSOLE. OPERATIONAL EVALUATION OF BENEFITS LIMITATIONS AND RECOMMENDATIONS.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 13J.
PB-174 089 HC$3.00 MF$0.65

17D. ELECTROMAGNETIC AND ACOUSTIC COUNTERMEASURES

A COMPARISON OF SEVERAL APPROXIMATIONS FOR THE DETERMINATION OF PLAS-

MA LAYER PROPERTIES FROM THE MEASURED ELECTROMAGNETIC TRANSMISSION COEFFICIENT,
GM Defense Research Labs., Santa Barbara, Calif.
S. V. Zivanovic, H. M. Musal, Jr., R. I. Primich, and J. Allen. Dec 63, 138p TR63-217G
Contract DA-04-495-ORD-3567 (Z), ARPA Order-347-63

Descriptors: (*Plasma medium, Propagation), (*Electromagnetic waves, Measurement), Wave transmission, Tables, Numerical analysis, Refractive index, Computers, Electron density, Plasma sheath, Frequency.

Several commonly used approximations of the transmission coefficient of a uniform plasma slab are critically examined and are compared with a new approximation. It is shown that the new approximation, in addition to being very suitable for use on digital computers, gives much higher accuracy than any other one over most useful values of plasma and collision frequencies. A series of charts shows the regions of validity of each approximation in the plasma frequency-collision frequency plane for various amounts of error and slab thicknesses. (Author)
AD-432 026 HC$3.00

17E. INFRARED AND ULTRAVIOLET DETECTION

IR DETECTOR TEMPERATURE REGULATOR FOR CO VIBRALUMINESCENCE STUDIES.
Utah State Univ., Logan. Electro-Dynamics Labs.
For primary bibliographic entry see Field 20F.
AD-646 429 HC$3.00 MF$0.65

RESEARCH DIRECTED TOWARD THE STUDY OF INFRARED TRANSMISSION THROUGH VARIOUS ATMOSPHERES.
North Carolina State Univ., Raleigh. Physical Science Research.
For primary bibliographic entry see Field 20F.
AD-646 884 HC$3.00 MF$0.65

DETECTOR INVESTIGATION FOR 8-15 AND 100-4000 MICRON REGIONS.
Semiannual technical summary rept. no. 22, 1 Jul-31 Dec 66,
Naval Research Lab., Washington, D. C.
H. Shenker. Jan 67, 58p NRL-MR-1743
Research supported in part by ARPA, ARPA Order-269-62, and ONR. Rept. on Proj. Defender. See also AD-639 223.

Descriptors: (*Infrared detectors, *Semiconductor devices), Solid solutions, Cadmium alloys, Zinc alloys, Arsenic alloys, Single crystals, Epitaxial growth, Casting, Indium antimonides, Doping, Selenium, Crystal detectors, Spectroscopy, Cryogenics, Germanium, Photoelectric cells (Semiconductor).

Emphasis was placed on research on the preparation of Cd3As2, Zn3As2, and their alloy system. Successful growth of sound, single crystal ingots of the alloy system by the Bridgman technique was achieved. Successful epitaxial growth of Cd3As2 layers on alloy substrates was also achieved. The response of the InSb free electron (Rollin Detector) was extended into the 120 to 200 micron spectral region. By using high purity InSb intentionally doped with Se it was found that Rollin detectors usable at wavelengths as short as 80 microns could be obtained. The study of the magnetically tuned InSb detector was continued. It was found that operation in the longitudinal direction generally resulted in a detector having such a large noise that it was not usable. For a detector in the transverse configuration it was found that the responsivity for the high energy peak was consistent with the calculated responsivity based on a bolometer mechanism for this detector. It was found that the negative magnetoresistance effect in InSb was not dependent upon the lattice temperature but only upon the electron temperature of the sample. A copy of a paper entitled 'Magnetooptical Studies of Solids Using Fourier Transform Spectroscopy' by R. Kaplan is included as an appendix.
AD-646 927 HC$3.00 MF$0.65

17G. NAVIGATION AND GUIDANCE

PHYSICAL BASES OF ROCKET WEAPONRY,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 19G.
AD-646 517 HC$3.00 MF$0.65

MPL ACOUSTIC TRANSPONDER,
Scripps Institution of Oceanography, San Diego, Calif. Marine Physical Lab.
M. S. McGehee, and D. E. Borgeman. 18 Jul 66, 8p MPL-U-6-66
Contract Nonr-2216 (05)
Revision of manuscript submitted 10 Jun 66.
Availability: Published in The Review of Scientific Instruments v37 n11 p1450-5 Nov 1966.

Descriptors: (*Transponders, Underwater sound equipment), Deep water, Underwater navigation.

A description is given of a compact, low cost expendable acoustic transponder suited for use in the deep ocean. A unique signal recognition circuit is employed that gives a very high ratio of correct answers to false replies when exposed to the wide variety of noises found in the sea. A very low battery drain permits a relatively small supply to last for a year or more, thus resulting in an instrument that can be easily handled at sea. (Author)
AD-646 521 Not available from CFSTI

EARTH COVER AND CONTOUR EFFECTS ON IMAGE GLIDE PATHS. PHASE II.
Final rept.,
Ohio Univ., Athens. Dept. of Electrical Engineering.
Richard H. McFarland, James T. Gorman, David A. Hill, Don L. Luttermoser, and David A. Miller. 10 Jul 66, 119p EER-5-5
FAA-RD-66-39
Contract FA-64-WA-5060

Descriptors: (*Glide path systems, Monitors), (*Instrument landings, Terrain), Flight paths, Mathematical models, Snow, Landing fields, Radio navigation, Radio signals, Scattering, Computer programs, Soils, Dielectric properties.

The report presents the results of Phase II of a research and development effort to provide quantitative information on the effects of earth contours and ground plane snow covers on the Null-Reference, Sideband-Reference, and Capture-Effect Glide Path Systems. The mathematical model developed in Phase I (see AD-618 085) was used to predict the amplitude and position of glide path roughness at Pittsburgh, Pennsylvania; Charleston, West Virginia; and Ohio University Airport, Athens, Ohio, due to reflection of signals from irregular terrain in the approach region. Pittsburgh and Charleston predictions were confirmed by comparing with FAA flight inspection data. Development of a second mathematical model begun in Phase I was completed in this phase to provide a clear indication of effects on the monitor produced by snow coverings on the earth between the transmitter and the monitor. Computer calculations demonstrated that the glide path angle may be expected to increase or decrease at the monitor depending on the value of the dielectric constant of the snow. Low values of dielectric constant which are associated with light, fluffy, dry snow produce a decrease in path angle at the monitor and a wet snow with a high dielectric constant produces a raising of this path angle. Evidence from field measurements corroborates the calculated results. (Author)
AD-646 561 HC$3.00 MF$0.65

EXPERIMENTAL DETERMINATION OF THE SUITABILITY OF PULSED LIGHT SYSTEMS FOR SEMIACTIVE HOMING AGAINST TANKS,
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
R. A. Hayman, and R. F. Schneeberger. Jun 61, 88p CAL-GJ-1499-G
Contract DA-30-069-509-ORD-3191

Descriptors: (*Homing devices, *Light homing), (*Tanks (Combat vehicles), Homing devices), Guidance, Target recognition, Experimental data, Lasers, Ultraviolet radiation.

The report describes an experimental test program which was conducted to investigate the feasibility of utilizing pulsed-light techniques in a semiactive guidance system. The system tested consisted of a pulsed-light illuminator and an optical receiving system, both operating in the nominally blue portion of the spectrum, with a conically scanned receiver aperture. During each test, the illuminator and the optical receiving system were pointed at the target using optical sights. Tests were run with the illuminator located either near or remote from the receiver for different phases of the program. With the boresight of the receiving system optically aligned to different portions of targets at various ranges, the video output of the receiver was examined. The primary objective of this experiment was to determine the ranges at which various targets could be detected and at which scan-modulation outputs could be derived. As a secondary objective, a qualitative experimental investigation and theoretical analysis was made of the relation of such factors as scan rate, receiver aperture, photomultiplier gain, etc. on the overall operation of the pulsed-light semiactive system. It is concluded from this program that the pulsed-light technique can be utilized in a semiactive guidance system with expected ranges up to 2 kilometers on typical targets under conditions of fair visibility with the illuminator and receiver at the same range from the target. (Author)
AD-646 644 HC$3.00 MF$0.65

INVESTIGATION OF INERTIAL SYSTEM ERROR ANALYSIS METHODS.
Phase rept.,
Naval Air Development Center, Johnsville, Pa. Aero Mechanics Dept.
Steven R. Ellms. 29 Dec 66, 53p NADC-AM-6663

Descriptors: (*Inertial navigation, Instrumentation), (*Statistical analysis, Inertial navigation), Errors, Statistical tests, Aircraft, Navigation.

An investigation of several more common measures of inertial system performance is made (utilizing actual flight test data) and the circumstances under which they are satisfactory, as well as the most frequent misunderstandings that can result, are discussed. The statistical question of determining the ensemble parameters, from the point of view of designing a minimum cost test to give the desired system performance parameters, is also discussed. (Author)
AD-646 753 HC$3.00 MF$0.65

WEATHER INFORMATION REMOTING AND DISPLAY SYSTEM.
Westinghouse Electric Corp., Baltimore, Md.
For primary bibliographic entry see Field 17B.
AD-646 766 HC$3.00 MF$0.65

THE USE OF RADAR GATING DEVICES FOR REJECTION OF FALSE ATCRBS REPLIES.
Federal Aviation Agency, Washington, D. C. Systems Research and Development Service.
For primary bibliographic entry see Field 17I.
AD-646 874 HC$3.00 MF$0.65

IMPROVED ATC TRANSPONDER ANTENNA PERFORMANCE.
Federal Aviation Agency, Washington, D. C. Systems Research and Development Service.
For primary bibliographic entry see Field 9E.
AD-646 877 HC$3.00 MF$0.65

SOME CALCULATIONS OF IONOSPHERIC REFLECTION COEFFICIENTS FOR LOW FREQUENCY RADIO WAVES.
Royal Aircraft Establishment, Farnborough (England).
For primary bibliographic entry see Field 20N.
AD-646 900 HC$3.00 MF$0.65

U. S. NAVY DOPPLER TRACKING SYSTEM TRANET.
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
For primary bibliographic entry see Field 22D.
AD-646 904 HC$3.00 MF$0.65

TECHNICAL EVALUATION OF EIDOPHOR.
Final rept.,
National Aviation Facilities Experimental Center, Atlantic City, N. J.
Floyd B. Woodson. Sep 66, 52p
FAA-RD-66-69

Descriptors: (*Television display systems, *Air traffic control systems), Television equipment, Radar equipment, Display systems, Feasibility studies.
Identifiers: Eidophor, Evaluation.

A technical evaluation of the Eidophor large screen TV display was performed. The purpose of the evaluation was to determine the equipment suitability for implementation into the air traffic control environment. The areas of concern included display quality, equipment reliability and maintainability, projector layout, screen selection and size, interfaces with existing equipments, a system performance in an anticipated equipment configuration, and an ambient lighting system for viewing areas. It was concluded that the Eidophor is suitable for use in the air traffic control environment. Recommendations are made for equipment modifications to better the interface with existing equipments. Guidelines are established planning layout and maintenance. Documentation requirements are established. An ambient lighting system is recommended. References is made to the literature for application data. (Author)
AD-646 913 HC$3.00 MF$0.65

ON THE CALCULATION OF AN INERTIAL NAVIGATION SYSTEM,
Redstone Scientific Information Center, Redstone Arsenal, Ala. Translation Branch.
N. Ya. Vovchenko. 12 Dec 66, 17p RSIC-621
TT-67-60987
Trans. of unidentified mono., Moscow, 1965 p76-85.

Descriptors: (*Inertial navigation, Stabilized platforms), Acceleration, Instrumentation, Equations, Gyro stabilizers, USSR.

The article presents a refinement of previously derived dynamics equations for the calculation of a geometrical inertial navigation system. The operation of the system during the motion of an object in a great circle relative to the earth is considered. An estimate is made of the methodological errors due to translational and Coriolis accelerations. (Author)
AD-646 934 HC$3.00 MF$0.65

SHIP'S BRIDGE CONTROL CONSOLE. OPERATIONAL EVALUATION OF BENEFITS LIMITATIONS AND RECOMMENDATIONS.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 13J.
PB-174 089 HC$3.00 MF$0.65

LOOKOUT ASSIST DEVICE FEASIBILITY STUDIES. VOLUME I. HUMAN FACTORS, COLLISION STATISTICS, ECONOMICS FACTORS OPERATIONS RESEARCH, SENSOR TECHNIQUES.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 090 HC$3.00 MF$0.65

LOOKOUT ASSIST DEVICE FEASIBILITY STUDIES. VOLUME II. SYSTEM RECOMMENDATIONS, (PROXIMITY AND TAU SYSTEMS), PERFORMANCE ESTIMATES, SYSTEMS PARAMETERS STUDY, A TAU CRITERION DISPLAY SYSTEM.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 091 HC$3.00 MF$0.65

LOOKOUT ASSIST DEVICE FEASIBILITY STUDIES. VOLUME III. USAGE OF SOUND AT SEA, CONNING FUNCTION STUDIES, CUE SOURCES AND THEIR VALUE, PSYCHOACOUSTICS, PHYSICAL FACTORS, WORK ACTIVITY FACTORS.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 092 HC$3.00 MF$0.65

LOOKOUT ASSIST RADAR EVALUATION PROGRAMS.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 093 HC$3.00 MF$0.65

LOOKOUT ASSIST RADAR DEVELOPMENT.
Sperry Piedmont Co., Charlottesville, Va.
For primary bibliographic entry see Field 17I.
PB-174 094 HC$3.00 MF$0.65

17H. OPTICAL DETECTION

EXPERIMENTAL DETERMINATION OF THE SUITABILITY OF PULSED LIGHT SYSTEMS FOR SEMIACTIVE HOMING AGAINST TANKS,
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
For primary bibliographic entry see Field 17G.
AD-646 644 HC$3.00 MF$0.65

17I. RADAR DETECTION

STUDY OF PULSED RADIATION EFFECTS ON MICROWAVE FERRITE DUPLEXERS.
Quarterly report no. 7, 1 Nov 63-29 Feb 64.
Sperry Microwave Electronics Co., Clearwater, Fla.
29 Feb 64, 59p
Contract DA-36-039-sc-89113

Descriptors: (*Radar duplexers, *Radiation damage), Tests, Ferrites, Microwave frequency, Waveguide circulators, Limiters, Waveguides, Calibration, Dosimeters, Waveguide couplers, Measurement, Attenuation, C band, Radiofrequency power, Transients.

The results of the fifth series of radiation environmental experiments conducted during the seventh quarter of the program is reported. Included in the report are a description of the equipment used to perform the experiments, the measurement techniques employed, and a complete dosimetry report. Photographs of important phases of the test are given to provide the reader with a better insight into the study. The microwave high power tests, which were initiated during the fourth series of tests, were continued for the fifth series of experiments. Conclusions presented are based upon the data taken thus far, including the fourth and fifth series of tests with high power operation. (Author)
AD-442 524 HC$3.00

SOME PROPERTIES OF THE ELECTROMAGNETIC FIELD IN A STRATIFIED LAYER,
Ohio State Univ. Research Foundation, Columbus. Antenna Lab.
For primary bibliographic entry see Field 9E.
AD-453 129 HC$3.00

A COMPARISON OF AVERAGE LIKELIHOOD AND MAXIMUM LIKELIHOOD RATIO TESTS FOR DETECTING RADAR TARGETS OF UNKNOWN DOPPLER FREQUENCY,
RAND Corp., Santa Monica, Calif.
L. E. Brennan, I. S. Reed, and W. Sollfrey. Dec 66, 43p RM-5198-PR
Contract AF 49 (638)-1700

Descriptors: (*Radar targets, *Detection), (*Statistical analysis, Detection), Search radar, Coherent radar, Doppler effect, Probability density functions, Statistical tests.
Identifiers: Likelihood.

The performance of the average likelihood and the maximum likelihood ratio tests is compared in detecting a slowly fluctuating target with a Rayleigh amplitude distribution and unknown doppler frequency. The study concludes that since the performance of the two tests does not differ significantly, implemention of the more complex average likelihood ratio detector is not warranted in search radars for the assumed target model. (Author)
AD-646 366 HC$3.00 MF$0.65

RADAR SCATTERING FROM BLUNTED CONE TIPS.
Revised ed.,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
S. D. Weiner, and S. L. Borison. 22 Jun 66, 8p
Revision of manuscript submitted 22 Mar 66. Supported by U. S. Advanced Research Projects Agency.
Availability: Published in IEEE Transactions on Antennas and Propagation vAP14 n6 p774-81 Nov 1966.

Descriptors: (*Radar echo areas, Conical bodies), Scattering, Mathematical analysis, Radar signals.

The radar cross section is calculated for semi-infinite perfectly conducting cones with tips which are blunted in one of several ways. Calculationr have been performed for nos-on incidence using exact theory, and for nose-on and near nose-on incidence using the physical optics approximation. The calculations have been restricted to narrow-angle cones and, in most cases, to tip dimensions small compared with a wavelength. For the rounded tip (spherical tip attached smoothly to the cone), the calculations agree very well with the physical optics approximation. Thus, the use of physical optics for nonzero aspect angles seems justified. (Author)
AD-646 486 Not available from CFSTI.

ADDITION OF SIGNAL CONDITIONING AND DATA PROCESSING CAPABILITY TO THE UNATTENDED METEOR TRAIL WIND AND DENSITY SET.

Final rept., Sep 64-Feb 66,
Indatacon Corp., Bolton, Mass.
William H. Ramsey. 30 Feb 66, 26p
AFCRL-66-438
Contract AF 19 (628)-4307

Descriptors: (*Meteorological radar, *Wind), (*Doppler radar, Meteorological radar), Density, Radar equipment, High altitude, Meteors, Antennas, Data processing systems, Radar signals, Radar transmitters, Radar duplexers, Radar receivers.

The document contains an overall description of the system and includes operating parameters, etc. The theoretical accuracies in determining slant range, elevation angle, altitude, wind velocity and density by photographic recording and digital computation are described. The experimental accuracies achieved for these quantities are also discussed and a comparison is made. (Author)
AD-646 668 HC$3.00 MF$0.65

A MODEL OF RADAR SCATTERING FROM THE CONE-SPHERE.
Technical note,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
S. D. Weiner. 20 Oct 66, 35p TN-1966-47
ESD-TR-66-550
Contract AF 19 (628)-5167, ARPA Order-498

Descriptors: (*Radar pulses, Scattering), (*Radar echo areas, *Mathematical models), Conical bodies, Spheres, Continuous wave radar, Optics, Integrals, Electromagnetic waves.

A technique is presented for calculating the radar cross section of a conducting cone-sphere as a function of cone angle, aspect angle, tip radius, base radius, and wavelength for both cw and short-pulse incident signals. A modification of the physical optics approximation is used in which the incident sinusoidal wave is replaced by a pulse of triangular waves, permitting the physical optics integrals to be replaced by finite summations. Creeping waves are included by using the known results for a sphere combined with an aspect-angle dependence obtained from a ray-tracing model. For long incident pulses, the calculated cross sections show good agreement with cw measured values. For short incident pulses, the behavior of individual scattering centers may be studied as a function of the target parameters. (Author)
AD-646 853 HC$3.00 MF$0.65

THE USE OF RADAR GATING DEVICES FOR REJECTION OF FALSE ATCRBS REPLIES.
Technical rept.,
Federal Aviation Agency, Washington, D. C. Systems Research and Development Service.
Joseph E. Herrmann. Jan 67, 11p FAA-RD-67-1

Descriptors: (*Radar beacons, *Air traffic control systems), Performance (Engineering), Radar equipment, Antenna lobes, Suppressors, Inhibition.

In addition to valid targets, the Air Traffic Control Radar Beacon System is susceptible to signal reflections that produce false signals. The effect is most noticeable at terminal facilities where airport buildings and other structures are close to the beacon antenna site. Some long range sites may also experience reflections to a lesser degree. The Agency program for implementation of side lobe suppression is directed towards a solution of the reflection problem. Technical tests have confirmed that SLS is effective and most reflections will be suppressed. Civil transponders have SLS capability today, but military transponders will not be fully updated until 1972. When operational precautions are taken, the interim use of special beacon gating devices that rely on primary radar signals is justified at some sites until SLS is implemented. (Author)
AD-646 874 HC$3.00 MF$0.65

OROGRAPHIC EFFECTS ON PRECIPITATION PROCESSES.
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 4B.
AD-646 894 HC$3.00 MF$0.65

U. S. NAVY DOPPLER TRACKING SYSTEM TRANET.
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
For primary bibliographic entry see Field 22D.
AD-646 904 HC$3.00 MF$0.65

RADAR BEACON SYSTEM AND ANTENNA EVALUATION PROGRAM FOR SD-1 DRONES. VOLUME I,
Radioplane Co., Van Nuys, Calif.
D. E. Shaw. 18 Jul 58, 55p Radioplane-2010-Vol-1
Contract DA-36-039-sc-67951
See also AD-646 906.

Descriptors: (*Radar beacons, *Drones), (*Aircraft antennas, Radar beacons), Performance (Engineering), Compatibility, Radar equipment, Radar antennas, Radar tracking, Slot antennas, Lens antennas, Installation.
Identifiers: AN/USD-1, AN/DPN-32.

The report presents: (1) The requirements of a suitable Radar Tracking Assist System for the SD-1 (RP-71F) Surveillance Drone, (2) results of installation and electrical interference investigations concerning the compatibility of an AN/DPN-32 Beacon with the SD-1 vehicle equipment, (3) the results of an antenna evaluation study, and (4) a program plane outline for a permanent, optimized system. Data obtained from the investigations and studies are also included, together with the resulting recommendations.
AD-646 905 HC$3.00 MF$0.65

RADAR BEACON SYSTEM AND ANTENNA EVALUATION PROGRAM FOR SD-1 DRONES. APPENDIX. VOLUME II,
Radioplane Co., Van Nuys, Calif.
D. E. Shaw. 18 Jul 58, 183p Radioplane-2010-Vol-2
Contract DA-36-039-sc-67951
See also AD-646 905.

Descriptors: (*Aircraft antennas, Antenna radiation patterns), (*Radar beacons, *Drones), Model tests, Slot antennas, Lens antennas, Dipole antennas, Configuration, K band, Radar antennas.
Identifiers: AN/USD-1.

The volume contains antenna radiation patterns for tri-slot, lens and 3/4 wavelength stub antennas at 9400MC.
AD-646 906 HC$3.00 MF$0.65

INFLUENCE OF DATA TYPE AND RATE ON SHORT ARC LUNAR ORBIT DETERMINATION.
TRW Systems, Redondo Beach, Calif.
For primary bibliographic entry see Field 22C.
For abstract, see STAR 05 06.
N67-16573 HC$3.00 MF$0.65

REVIEW OF A DSIF DATA TAKING AND ORBIT DETERMINATION METHOD.
TRW Systems, Redondo Beach, Calif.
For primary bibliographic entry see Field 22C.
For abstract, see STAR 05 06.
N67-16574 HC$3.00 MF$0.65

MOVEMENT AND PREDICTABILITY OF RADAR ECHOES.
Technical memo.,
Travelers Research Center, Hartford, Conn.
James Warren Wilson. Nov 66, 35p
NSSL-28
Contract Cwb-11093

Descriptors: (*Radar echo areas, *Motion), (*Meteorological radar, Storms), Pattern recognition, Thunderstorms, Photography, Computers, Correlation techniques, Sequences, Intensity, Predictions, Radar reflections, Weather forecasting.

Quantitative weather radar data collected by the WSR-57 radars at Atlantic City, N. J. and Norman, Okla. have been analyzed with high speed computers to investigate the movement and predictability of weather radar echoes. The location of the maximum cross-correlation coefficient between two echo patterns is used as an objective means for measuring the movement and predictability of the echo patterns. An equation is developed for converting the magnitude of the cross-correlation coefficient to percent 'hits.' Considerable variability exists in the predictability of the echo patterns. Regression equations specify the predictability of an echo pattern based on the individual pattern's statistical properties. Over two-thirds of the variance in the predictability can be explained by scale and intensity parameters of the echo patterns. Filtering techniques have been applied to the data to investigate the velocity and predictability of different scale features within the pattern. Features with wavelengths less than 20 mi. have little or no predictability for periods greater than 20 min., and their velocity is close to the mean wind velocity between 10,000 and 20,000 ft. The predictability of larger-scale features often remains high for hours; these features move to the right of the smaller-scale features and their speed is generally less. (Author)
PB-173 972 HC$3.00 MF$0.65

LOOKOUT ASSIST DEVICE FEASIBILITY STUDIES. VOLUME I. HUMAN FACTORS, COLLISION STATISTICS, ECONOMICS FACTORS OPERATIONS RESEARCH, SENSOR TECHNIQUES.
Final rept.
Sperry Piedmont Co., Charlottesville, Va.
Aug 65, 152p Pub-JA-240-0007-VOL-1
Contract MA-3374
See also PB-174 091 and PB-174 092.

Descriptors: (*Radar, Navigational aids), (*Ships, *Safety), Human engineering, Accidents, Statistical analysis, Economics, Operations research, Sensors, Display systems, Radar equipment, Radar navigation, Warning systems, Feasibility studies.

A study of human factors and collision statistics showed that a proximity warning device would fit into the traditional mode of ship operation and should materially improve the chance of avoiding collision. Economics studies and questionnaires indicated acceptable price and maintenance levels. An operational analysis defined range and bearing accuracy requirements. A sensor study showed that an adaptation of radar techniques, possibly backed up by passive sonic sensors, will offer the most reliable and inexpensive approach for solving the proximity sensing requirement. A study of displays indicated acceptable techniques for transferring sensor outputs to the lookout. Although the studies were directed primarily towards the feasibility and desirability of a proximity warning device, certain other problem areas were probed, notably the degree of danger assessment and the need for better maneuver plan data. The conclusion was that the 'Tau' criterion should be used in the danger assessment function rather than the orthodox constant bearing criterion. Additionally, the conclusion was reached that the effectiveness of maneuver planning can be enhanced by true motion

displays, but that a high resolution, high information rate radar capable of displaying target aspect is probably more useful.
PB-174 090 HC$3.00 MF$0.65

LOOKOUT ASSIST DEVICE FEASIBILITY STUDIES. VOLUME II. SYSTEM RECOMMENDATIONS, (PROXIMITY AND TAU SYSTEMS), PERFORMANCE ESTIMATES, SYSTEMS PARAMETERS STUDY, A TAU CRITERION DISPLAY SYSTEM.
Final rept.
Sperry Piedmont Co., Charlottesville, Va.
Aug 65, 67p Pub-JA-240-0007-VOL-2
Contract MA-3374
See also PB-174 090 and PB-174 092.

Descriptors: (*Radar, Navigational aids), (*Ships, *Safety), Feasibility studies, Warning systems, Performance (Engineering), Systems engineering, Display systems, Radar equipment, Radar navigation, Costs.

Contents: System recommendations - Proximity warning device; The Tau System; System performance estimates - Estimate of performance of SRP system against surface targets; False alarm rate for guard ring, automatic detection; Performance estimate for the tau system; System study - System parameters study; introduction, the super-regenerative principle; characteristics of the slope-controlled state: noise power, magnitude of quench slope G' (t sub i), effect of frequency shift, gain and gain control, pulse length and decay time, minimum widths of the quench cycle, scan rate and hits per scan, pulse repetition rate, optimum integration parameters; Calculation of available information signal; State-of-the-art of miniature x-band microwave oscillators; Summary of revised tentative systems specifications.
PB-174 091 HC$3.00 MF$0.65

LOOKOUT ASSIST DEVICE FEASIBILITY STUDIES. VOLUME III. USAGE OF SOUND AT SEA, CONNING FUNCTION STUDIES, CUE SOURCES AND THEIR VALUE, PSYCHOACOUSTICS, PHYSICAL FACTORS, WORK ACTIVITY FACTORS.
Sperry Piedmont Co., Charlottesville, Va.
Sep 66, 159p Pub-JA-240-0059-1
Contract MA-3374
See also PB-174 091 and PB-174 093.

Descriptors: (*Radar, Navigational aids), (*Ships, *Safety), Sound, Hearing, Decision making, Navigation, Redundant components, Human engineering, Feasibility studies, Warning systems.

One objective of the document was to generate a unified and scientific approach to improving the conning efficiency. Section 1.0 is a review of the traditional uses of sound and hearing in the conning function against the framework and concepts of the Human Factors Study of the Volume I feasibility study. Section 2.0 introduces the concepts of 'cue source' and 'cue measure', and applies these concepts to evaluating the present conning data sources and potential improvements possible through H-LAD and other devices. Section 3.0 discusses the merits of having redundant cue sources in forming conning decisions and defines the optimal usage of such data. Section 4.0 compares man and machine in his capacity to detect sound signals and to derive the necessary data from the signals; tentative conclusions are given for the dichotomy of functions to be performed by the conning officer and H-LAD. Appendix A suggests further improvements in the conning function that might result through use of improved cue sources and the application of other disciplines. (Author)
PB-174 092 HC$3.00 MF$0.65

LOOKOUT ASSIST RADAR EVALUATION PROGRAMS.
Final rept.
Sperry Piedmont Co., Charlottesville, Va.
Mar 66, 65p Pub-JA-240-0007-30
Contract MA-3374
See also PB-174 094, and PB-174 092.

Descriptors: (*Radar, Navigational aids), (*Ships, Safety), Radar equipment, Effectiveness, Performance (Engineering), Warning systems, Detection, Radar navigation.

The results of this evaluation program demonstrate that the Proximity Warning Principle has considerable utility as both an operational aid to the watch officer and a method of improving the safety of ships at sea. This is particularly true if the device used to implement the principle has an adequate detection range. A reliable range of 10 to 12 miles would permit the watch officer to make maximum use of a Proximity Warning Alarm. The original system concept intended that the Lookout Assist Device would serve as a conning aid on the high seas. In this environment the unit in its present form is quite useful over a limited ship-to-intruder range. Data indicates a high probability of detection of all vessels properly classified as ships which intrude within an outer guard ring interval from 4.5 to 6 miles. All metal hull boats of LCI size or larger should be detected in the inner guard ring. In coastal waters the system is not as good as it is on high seas due to the nature of targets encountered. The safety of small craft and the ship lookout function would be greatly improved if all small craft operating in shipping lanes were required to mount radar reflectors. An even more serious condition exists in the case of towed barges encountered in both coastal and inland waters. These may pass undetected through both rings. This type of intruder represents a real danger to the seagoing vessel.
PB-174 093 HC$3.00 MF$0.65

LOOKOUT ASSIST RADAR DEVELOPMENT.
Final rept.
Sperry Piedmont Co., Charlottesville, Va.
Jun 66, 119p Pub-JA-240-0007-34
Contract MA-3374
See also PB-174 093.

Descriptors: (*Radar, Navigational aids), (*Ships, Safety), Radar equipment, Design, Search radar, Diagrams, Circuits, Warning systems.

The report is limited to a discussion of system considerations and circuit design results which are necessary to implement the superregenerative system specifications resulting from the Phase I study program. One section gives a brief functional description of the final system in block diagram form. For the reader interested in unit design and detailed circuit operation this report also contains a section on design considerations; 9 sections which give unit design and detailed circuit functioning; and 6 reference appendices.
PB-174 094 HC$3.00 MF$0.65

17J. SEISMIC DETECTION

VESIAC MONTHLY BULLETIN OF VELA UNIFORM RESEARCH PUBLICATIONS.
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
For primary bibliographic entry see Field 8K.
AD-646 573 HC$3.00 MF$0.65

SEISMIC DISCRIMINATION.
Semiannual technical summary rept., 1 Jul-31 Dec 66,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Paul E. Green, 31 Dec 66, 42p
ESD-TR-67-18
Contract AF 19 (628)-5167, ARPA Order-512
See also AD-637 308.

Descriptors: (*Seismology, *Detection), (*Seismometers, Montana), Seismic waves, Signals, Performance (Engineering), Epicenter, Seismological stations, Sensors, Underwater explosions, Earthquakes.

Studies were made of the ability of a single Large Aperture Seismic Array (LASA) station to detect and roughly locate teleseismic events and to generate outputs derived from various long- and short-period seismogram parameters, particularly those related to exact epicenter location and source discrimination. The behavior of networks that exchange such data and that consist of both small and large array stations has begun to receive attention. Computer-controlled automatic monitoring and maintenance of large seismometer arrays are discussed. (Author)
AD-646 677 HC$3.00 MF$0.65

GEOSCIENCES AND TECHNOLOGY BULLETIN, VOL. 1, NO. 3, 1966.
Library of Congress, Washington, D. C. Aerospace Technology Div.
Dec 66, 38p
TT-67-60881
Consists of abstracts or annotations of Soviet, East European, and Communist Chinese open-source scientific literature. See also AD-646 746.

Descriptors: (*Seismology, Reviews), (*Underground explosions, Detection), (*Geophysical prospecting, Seismology), (*Structural geology, Seismology), (*Lithosphere, Seismology), Acoustics, Ultrasonic radiation, Rock (Geology), Mining engineering, Mountains, Marine geophysics, Earthquakes, Orogeny, Faults (Geology), Gravity, Computers, Seismographs, Terrain, Seismic waves, Drilling, Heat transfer, Nuclear explosions, USSR, Eastern Europe.
Identifiers: Karst topography, Tectonics.

Abstracts are given of papers in the following categories: Use of sonics and ultrasonics in geosciences; Regional seismicity; Tectonics and deep structures; Investigation of the Earth's crust; Use of computers in seismology; Karst; Low velocity channel in Rumania; Boreholes used in heat flow measurements; Miscellaneous.
AD-646 738 HC$3.00 MF$0.65

GEOSCIENCES AND TECHNOLOGY BULLETIN, VOL. 1, NO. 2, 1966.
Library of Congress, Washington, D. C. Aerospace Technology Div.

Nov 66, 33p
TT-67-60879
Consists of abstracts or annotations of Soviet, East European, and Communist Chinese open-source scientific literature. See also AD-641 717.

Descriptors: (*Seismology, Reviews), (*Underground explosions, Detection), (*Lithosphere, Seismology), (*Geophysical prospecting, Seismology), (*Microseisms, Detection), Structural geology, Earthquakes, Marine geophysics, Mountains, Gravity, Seismological stations, Periodicals, Seismic waves, Nuclear explosions, USSR, Eastern Europe.

Abstracts are given of papers in the following categories: Investigation of the earth's crust; Regional seismicity; Seismological bulletins; Microseisms; Seismic prospecting; Miscellaneous.
AD-646 746 HC$3.00 MF$0.65

18. NUCLEAR SCIENCE AND TECHNOLOGY

18A. FUSION DEVICES (THERMONUCLEAR)

DETECTION ET ANALYSE DES PARTICULES CHARGEES ET NEUTRES APPLIQUEES A L'E-

TUDE DES PLASMAS CHAUDS (Detection and Analysis of Neutral and Charged Particles Applied to the Study of Hot Plasmas),
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 20I.
PB-174 036 HC$3.00 MF$0.65

18B. ISOTOPES

DECAY CHARACTERISTICS OF Pm146,
Naval Radiological Defense Lab., San Francisco, Calif.
For primary bibliographic entry see Field 18H.
AD-646 588 HC$3.00 MF$0.65

SHELL MODEL CALCULATION IN THE CALCIUM-ISOTOPES,
Michigan Univ., Ann Arbor. Dept. of Physics.
T. Engeland, and E. Osnes. 1966, 33p
Contract Nonr-1224 (59)
Prepared in cooperation with Oslo Univ. (Norway). Inst. of Physics.

Descriptors: (*Calcium, *Nuclear shell models), Nuclear energy levels, Interactions, Nuclear binding energy, Nuclear forces, Least squares method, Isotopes, Norway.

Shell model calculations are performed for the calcium isotopes assuming an effective interaction in the 1F sub F/2 exp. N and 1F sub F/2 exp. N-1 2P3/2 configurations. Both binding energies and level schemes are calculated in a least squares fit approach. Good agreement is obtained, particularly in the odd isotopes. The calculation is reproduced with the Surface Delta Interaction with one unknown parameter. The results show that this force is not able to describe the energy spectra and relative binding energies. (Author)
AD-646 702 HC$3.00 MF$0.65

CATALOG OF THE INSTRUMENTS USING NUCLEAR SOURCES AND UTILIZED FOR CONTROLLING AND AUTOMATION OF TECHNICAL PROCESSES, PRODUCED BY THE ALL-UNION GROUP ISOTOPE, 1965.
Division of Technical Information Extension (AEC), Oak Ridge, Tenn.
1965, 59p
TT-67-60999
Katalog Pribory, Deistve Kotorykh Osnovano na Ispolzovanii Istochnikov Yadernykh Izluchenii, clya Kontrolya i Avtomatizatsii Tekhnologicheskikh Protsessov, Postavlyaemye Vsesoyuznym Obbedineniem 'Izotop', trans. of mono. Radioizotopnye Pribory, Katalog, Moscow, 1965 58p.

Descriptors: (*Nuclear industrial applications, Radioactive isotopes), (*Radioactive isotopes, Industrial production), Nuclear radiation, Sources.

For abstract, see NSA 21 04.
AEC-TR-6699 HC$3.00 MF$0.65

A STUDY OF FLUORESCENT EXCITATION USING ISOTOPIC X-RAY EMISSION,
Texas Nuclear Corp., Austin.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 04.
ORO-3224-6 HC$3.00 MF$0.65

POSTABLE RADIOACTIVE ISOTOPE SNOW GAGES FOR PROFILING SNOWPACKS,
Forest Service, Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 04.
TID-23368 HC$3.00 MF$0.65

RADIATION TECHNOLOGY IN CONJUNCTION WITH POSTHARVEST PROCEDURES AS A MEANS OF EXTENDING THE SHELF LIFE OF FRUITS AND VEGETABLES.
California Univ., Davis. Dept. of Pomology.
For primary bibliographic entry see Field 6H.
For abstract, see NSA 21 04.
UCD-34P80-4 HC$3.00 MF$0.65

DOSIMETRY, TOLERANCE, AND SHELF LIFE EXTENSION RELATED TO DISINFESTATION OF FRUITS AND VEGETABLES BY GAMMA IRRADIATION.
Hawaii Univ., Honolulu. Coll. of Tropical Agriculture.
For primary bibliographic entry see Field 6H.
For abstract, see NSA 21 04.
UH-235P5-2 HC$3.00 MF$0.65

18C. NUCLEAR EXPLOSIONS

RESEARCH ON THEORETICAL SEISMOLOGY FINAL REPORT, JUL. 1, 1956 - JUN. 30, 1966.
Weizmann Inst. of Science, Rehovoth (Israel). American Committee.
For primary bibliographic entry see Field 8K.
For abstract, see STAR 05 06.
N67-15354 HC$3.00 MF$0.65

PLOWSHARE A SELECTED, ANNOTATED BIBLIOGRAPHY OF THE CIVIL, INDUSTRIAL, AND SCIENTIFIC USES FOR NUCLEAR EXPLOSIVES,
Division of Peaceful Nuclear Explosives (AEC), Washington, D. C.
For primary bibliographic entry see Field 5B.
For abstract, see NSA 21 04.
TID-3522 HC$3.00 MF$0.65

18D. NUCLEAR INSTRUMENTATION

PROGRAM 631A. VOLUME VI. EXPERIMENT D 8: RADIATION IN SPACECRAFT.
Air Force Weapons Lab., Kirtland AFB, N. Mex.
For primary bibliographic entry see Field 22A.
AD-646 555 HC$3.00 MF$0.65

CATALOG OF THE INSTRUMENTS USING NUCLEAR SOURCES AND UTILIZED FOR CONTROLLING AND AUTOMATION OF TECHNICAL PROCESSES, PRODUCED BY THE ALL-UNION GROUP ISOTOPE, 1965.
Division of Technical Information Extension (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 18B.
For abstract, see NSA 21 04.
AEC-TR-6699 HC$3.00 MF$0.65

LINEAR-LOG COUNTING-RATE METER UTILIZING THE TRANSCONDUCTANCE CHARACTERISTICS OF A SILICON PLANAR TRANSISTOR,
Argonne National Lab., Ill.
John J. Eichholz. Jun 66, 43p
Contract W-31-109-eng-38

Descriptors: (*Count-rate meters, Transistors), (*Transistors, Radiation measurement systems).

For abstract, see NSA 21 04.
ANL-6968 HC$3.00 MF$0.65

AN IMPROVED CRYOGENIC LIQUID-LEVEL SENSOR,
Argonne National Lab., Ill.
L. G. Hyman, J. F. Sheppard, and H. Spinka. Jul 66, 9p
Contract W-31-109-eng-38

Descriptors: (*Liquid level gages, Cryogenics), (*Cryogenics, Instrumentation), Heat transfer.

For abstract, see NSA 21 04.
ANL-7243 HC$3.00 MF$0.65

ELECTRICAL ANESTHESIA TECHNIQUES,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 6E.
For abstract, see NSA 21 04.
BNWL-317 HC$3.00 MF$0.65

NOTE ON A CLASS OF AMPLITUDE MODULATION DETECTORS,
Los Alamos Scientific Lab., N. Mex.
Beverly W. Washburn. 14 Jan 64, 26p
Contract W-7405-eng-36

Descriptors: (*Amplitude modulation, Detectors), (*Detectors, Signal-to-noise ratio).

For abstract, see NSA 21 04.
LA-3620-MS HC$3.00 MF$0.65

DETERMINATION OF DEFECTS IN SILICON P-I-N DETECTORS OF NUCLEAR RADIATION.
O Vyyavlenii Defektov V Kremniyevykh P-i-n Detektorakh Yadernykh Izlucheniy
National Aeronautics and Space Administration, Washington, D. C.
L. G. Yuskeseliyeva. Dec 66, 11p NASA-TT-F-10442
Transl. Into English From Joint Inst. For Nucl. Res. Rept. No. Jinr-p-2489, 1965 P 1-14

Descriptors: *Flaw, *P-n junction, *Silicon radiation detector, Carrier, Copper, Defect, Deposition, Detector, Diffusion, Electrochemical, Ion, Lithium, Microphotograph, Nuclear, Radiation, Semiconductor, Silicon.

For abstract, see STAR 05 06.
N67-15843 HC$3.00 MF$0.65

TRANSIENT RADIATION EFFECTS ON THERMOCOUPLES.
Cincinnati Univ., Ohio.
J. S. Crutchfield, and J. H. Leonard. 1966, 19p
NASA-CR-81333
Contract NGR-36-004-014
Presented At The 1966 Winter Meeting, Am. Nucl. Soc., Pittsburgh, Oct. 30 - Nov. 3, 1966

Descriptors: *Nuclear radiation, *Power reactor, *Radiation exposure, *Thermocouple, Damage, Effect, Exposure, Level, Measurement, Nuclear, Output, Power, Radiation, Rate, Reactor, Transient, Voltage.

For abstract, see STAR 05 06.
N67-16632 HC$3.00 MF$0.65

A STUDY OF FLUORESCENT EXCITATION USING ISOTOPIC X-RAY EMISSION,
Texas Nuclear Corp., Austin.
Troy C. Martin, Kenneth R. Blake, and Ira Lon Morgan. 30 Jun 66, 66p
Contract AT (40-1)-3224

Descriptors: (*X-ray absorption analysis, Fluorescence), (*Beta particles, Excitation), Photons, Sources, X-ray filters.

For abstract, see NSA 21 04.
ORO-3224-6 HC$3.00 MF$0.65

ETUDE DES DETECTEURS A GAZ POUR NEUTRONS THERMIQUES FONCTIONNANT EN COLLECTION DE COURANT (Gas Detectors for Thermal Neutron at High Counting Rates).
Doctoral thesis, in French,
Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
Vuong Quan Mai. 24 Sep 65, 135p CEA-R-2962
Text in French, summary in English.

Descriptors: (*Neutron detectors, *Ionization chambers), (*Thermal neutrons, Radiation measurement systems), Gas ionization, Cylindrical bodies, Electromagnetic pulses, Counting methods, Pulse amplifiers, Pulse discriminators, Space charges, Proportional counters, Circuits, Nuclear reactors, Neutron flux, France.

After reviewing the current pulse formation theory in a cylindrical shape counter with and without gas multiplication, schemes of pulse amplifier and level discriminator which permit the verification of the above calculations and clarify the part at hight counting rates of the space charge in proportional counters. The theory of that phenomenon is given. Along with the results obtained in a nuclear reactor with a counting-channel built with the above electronics circuits. (Author)
PB-174 034 HC$3.00 MF$0.65

MESURE D'UN FLUX DE PARTICULES NEUTRES PAR UNE METHODE THERMIQUE METTANT A CONTRIBUTION L'EFFET DE TEMPERATURE DES JONCTIONS (Measurement of a Neutral Particle Flux by a Thermal Method Using the Junction Temperature Effect),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 20H.
PB-174 048 HC$3.00 MF$0.65

EVALUATION OF THE MIDGET IMPINGER FOR SAMPLING U3O8 AND GRAPHITE AEROSOLS,
Sandia Corp., Albuquerque, N. Mex.
R. J. Everett, and S. Posner. Oct 66, 13p
Contract AT (29-1)-789
Prepared in cooperation with Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

Descriptors: (*Aerosols, Samplers), (*Samplers, Dust), Graphite, Uranium compounds, Oxides, Particle size, Sampling, Instrumentation.

For abstract, see NSA 21 04.
SC-RR-66-597 HC$3.00 MF$0.65

POSTABLE RADIOACTIVE ISOTOPE SNOW GAGES FOR PROFILING SNOWPACKS,
Forest Service, Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
James L. Smith, Donald W. Willen, and Michael S. Owens. 10 Feb 66, 53p
Contract AT (49-11)-2088

Descriptors: (*Radioactive isotopes, Snow), (*Snow, Radiation measuring systems), Postable, Meters, Density, Gamma ray scattering.

For abstract, see NSA 21 04.
TID-23368 HC$3.00 MF$0.65

MINIATURIZED RADIOTELEMETRY DEVICE FOR MONITORING TEMPERATURES,
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
For primary bibliographic entry see Field 9F.
For abstract, see NSA 21 04.
Y-1568 HC$3.00 MF$0.65

18E. NUCLEAR POWER PLANTS

FINAL SNAPSHOT PERFORMANCE REPORT,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 21F.
For abstract, see NSA 21 04.
NAA-SR-11934 HC$3.00 MF$0.65

ESTIMATION OF INTERIM REPLACEMENT COSTS OF DUAL-PURPOSE NUCLEAR-ELECTRIC SEA WATER CONVERSION STATIONS,
Oak Ridge National Lab., Tenn.
S. A. Reed, and J. C. Moyers. Dec 64, 35p
Contract W-7405-eng-26
For abstract see NSA 19 05.

Descriptors: (*Nuclear power plants, Electric power production), (*Sea water, Desalination), Costs, Distilling plants, Power reactors, Life expectancy, Pressurized water reactors.
ORNL-TM-994 HC$3.00 MF$0.65

18F. RADIATION SHIELDING AND PROTECTION

BIBLIOGRAPHY OF THE COMPUTER CODES LITERATURE EXAMINED BY THE RADIATION SHIELDING INFORMATION CENTER.
Oak Ridge National Lab., Tenn.
J. Gurney, B. F. Maskewitz, and B. L. Mc Gill.
Jul 66, 64p NASA-CR-81301, ORNL-RSIC-15
Contract NASA ORDER R-104/10/, W-7405-ENG-26

Descriptors: *Bibliography, *Computer program, *Radiation shielding, Code, Computer, Language, Nuclear, Program, Programming, Radiation, Shielding.

For abstract, see STAR 05 06.
N67-16540 HC$3.00 MF$0.65

BIBLIOGRAPHY, SUBJECT INDEX, AND AUTHOR INDEX OF THE LITERATURE EXAMINED BY THE RADIATION SHIELDING INFORMATION CENTER,
Oak Ridge National Lab., Tenn. Radiation Shielding Information Center.
S. K. Penny, D. K. Trubey, and J. Gurney. Nov 66, 585p
This document supersedes ORNL-RSIC-2, and ORNL-RSIC-5. For abstract see NSA 21 05.

Descriptors: (*Nuclear reactors, Bibliographies), (*Nuclear weapons, Bibliographies), Documentation, Indexes, Subject indexing, Radioactive isotopes.
ORNL-RSIC-5-Rev-1 HC$3.00 MF$0.65

A COMPUTER PROGRAM FOR THE ANALYSIS OF GAMMA-RAY SPECTRA BY THE METHOD OF LEAST SQUARES,
Public Health Service, Washington, D. C. Div. of Radiological Health.
For primary bibliographic entry see Field 6R.
PB-173 978 HC$3.00 MF$0.65

18H. RADIOACTIVITY

STUDY OF PULSED RADIATION EFFECTS ON MICROWAVE FERRITE DUPLEXERS.
Sperry Microwave Electronics Co., Clearwater, Fla.
For primary bibliographic entry see Field 17I.
AD-442 524 HC$3.00

TIME DEPENDENT NEUTRON TRANSPORT FROM A POINT ISOTROPIC SOURCE AT AN ALTITUDE OF (9.144 KM) 30,000 FT,
Braddock, Dunn, and McDonald, Inc., El Paso, Tex.
James P. George, and Albert Lavagnino. 12 Oct 66, 260p
DASA-1820-11
Contract DA-49-145-XZ-532

Descriptors: (*Neutron transport theory, Computer programs), (*Neutron flux, Atmosphere), Neutron detectors, Geometric forms, Distribution, Sources, Energy, Neutron scattering, Numerical analysis, Monte Carlo method, Radiological contamination.

The results of a run of the AUGEAS Monte Carlo neutron transport code (see AD-622 301) are presented. The neutron sources used are isotropic and monoenergetic, with source energies between 0.01 Mev and 14 Mev. The source altitude is 30 kilofeet in a reference atmosphere. A detailed rationale for locating the neutron detectors is givea. The neutron flux, resolved into 20 time intervals, and the neutron fluence, resolved into 16 energy intervals, is reproduced from the code output. Comprehensive total fluence curves are presented. Detailed flux vs. time and fluence vs. energy histograms are presented for the representative source energies 14 Mev and 1.4 Mev. (Author)
AD-646 458 HC$3.00 MF$0.65

DECAY CHARACTERISTICS OF Pm146,
Naval Radiological Defense Lab., San Francisco, Calif.
Leland R. Bunney, and Edith M. Scadden. 7 Feb 67, 19p USNRDL-TR-1109

Descriptors: (*Promethium, *Radioactive decay), Half life, Gamma emission, Gamma-ray spectra, Beta decay, Decay schemes.

The half-life of Promethium-146 was determined to be 2020 plus or minus 18 days. The radionuclide was produced by a (p,n) reaction on enriched Nd146. The decay of the purified Pm146 was followed on both beta-ray and gamma-ray counters. The gamma-ray energies were determined from pulse-height distribution curves obtained with a Ge (Li) detector. Prominent gamma-rays with energies of 453, 736 and 747 kev and low abundance gamma-rays with energies of 146, 589, 634 and 1189 kev were observed. (Author)
AD-646 588 HC$3.00 MF$0.65

IRRADIATION EFFECTS ON REACTOR STRUCTURAL MATERIALS.
Naval Research Lab., Washington, D. C.
For primary bibliographic entry see Field 18J.
AD-646 662 HC$3.00 MF$0.65

GAMOW-TELLER BETA DECAY IN HEAVY SPHERICAL NUCLEI AND UNLIKE PARTICLE-HOLE RANDOM PHASE APPROXIMATION.
Technical rept.,
Carnegie Inst. of Tech., Pittsburgh, Pa. Dept. of Physics.
John A. Halbleib, Sr., and Raymond A. Sorensen.
Jan 67, 80p TR-27
Contract Nonr-760 (15)
Supported in part by NSF and AEC, Rept. no. SC-DC-66-2376. Doctoral thesis. Prepared in cooperation with Niels Bohr Inst. Copenhagen (Denmark).

Descriptors: (*Beta decay, Selection rules), (*Nuclear models, Beta decay), Nuclei, Odd-Odd nuclei, Even-even nuclei, Nuclear forces, Positrons, Protons, Neutrons, Nuclear spins, Parity, Nuclear energy levels, Perturbation theory, Phonons, Approximation (Mathematics).

Allowed Gamow-Teller beta decay rates are calculated for medium and heavy spherical nuclei with the use of the pairing plus quadrupole model with additional n-p forces. A schematic force of the form 'chi tau. tau sigma. sigma' is found to be particularly important. A random phase approximation

treatment of this force is developed and shown to be correct in the weak and strong coupling limits. The relation between the retarded beta decay rates and a supermultiplet structure is discussed. (Author)
AD-646 749 HC$3.00 MF$0.65

CRITICAL STUDIES FOR THE FRENCH FAST REACTOR RAPSODIE (ZPR-3 ASSEMBLY 44),
Argonne National Lab., Idaho Falls, Idaho.
A. L. Hess, W. P. Kenney, and P. Caumette. Mar 66, 73p
Contract W-31-109-eng-38

Descriptors: (*Fast reactors, France), (*Reactor cores, Fast reactors), Critical assemblies, Reactor fuels.

For abstract, see NSA 21 04.
ANL-7044 HC$3.00 MF$0.65

HIGH TEMPERATURE RADIATION DAMAGE TO GRAPHITE. PART II. RADIATION DAMAGE IN GRAPHITE,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
J. T. Meers, J. F. Doar, and H. H. Yoshikawa. May 66, 57p
Contract AT (45-1)-1830
For abstract see NSA 21 01.

Descriptors: (*Graphite, Radiation damage), (*Radiation damage, High-temperature research), Thermal expansion, Nuclear radiation, Particle size, Carbon black, Density, Electron microscopy.
BNWL-237 HC$3.00 MF$0.65

ORLANDO AREA (ARMS-II),
Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.
R. B. Guillou. Apr 64, 19p
Contract AT (29-1)-1183

Descriptors: (*Radiation measurement systems, Radioactivity), (*Geology, Radiation measurement systems).

For abstract, see NSA 21 04.
CEX-63.6.1 HC$3.00 MF$0.65

FLIGHT DATA AND RESULTS OF RADIOCHEMICAL ANALYSES OF FILTER SAMPLES COLLECTED DURING 1965 UNDER PROJECT STARDUST,
New York Operations Office (AEC), N. Y. Health and Safety Lab.
Herbert W. Freely, David Katzman, Pierre E. Biscaye, John B. Panaccione, and Eugene R. French. 1 Jul 66, 88p
Prepared in cooperation with Isotopes, Inc., Westwood, N. J., under contract DA-49-146-XZ-079.
For abstract see NSA 21 05.

Descriptors: (*Debris, Samplers), (*Radiochemistry, Debris), Troposphere, Stratosphere, Fission products, Neutron activation, Radioactive isotopes, Radioactivity, Beta particles, Radon.
HASL-176 HC$3.00 MF$0.75

18I. REACTOR ENGINEERING AND OPERATION

1000-MW (E) METAL-FUELED FAST BREEDER REACTOR,
Argonne National Lab., Ill.
L. E. Link, J. E. Ayer, D. K. Butler, and W. J. Mecham. Jun 66, 125p
Contract W-31-109-eng-38

Descriptors: (*Breeder reactors, Reactor fuels), (*Reactor fuels, Fast reactors), Reactor fuel elements, Reactor cores, Costs.

For abstract, see NSA 21 04.
ANL-7001 HC$3.00 MF$0.65

CRITICAL STUDIES FOR THE FRENCH FAST REACTOR RAPSODIE (ZPR-3 ASSEMBLY 44),
Argonne National Lab., Idaho Falls, Idaho.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 04.
ANL-7044 HC$3.00 MF$0.65

FARET CONTROL ROD DRIVE MECHANISMS,
Argonne National Lab., Ill.
E. Hutter, T. E. Sullivan, and G. D. Giorgis. Jun 66, 36p
Contract W-31-109-eng-38

Descriptors: (*Control rods, Drives), (*Fast reactors, Control rods), Reactor system components, Reactor fuel elements, Reactor cores, Fuel burn up, Reactor lattice parameters.

For abstract, see NSA 21 04.
ANL-7158 HC$3.00 MF$0.65

FEASIBILITY STUDY FOR FABRICATION OF CU-B4C SHEET,
Los Alamos Scientific Lab., N. Mex.
R. W. Keil, R. E. Riley, and H. Sheinberg. 28 Dec 65, 89p
Contract W-7405-eng-36

Descriptors: (*Reactor feasibility studies, Reactor control), Copper, Boron, Carbides, Sheets, Costs, Manufacturing methods.

For abstract, see NSA 21 04.
LA-3570-MS HC$3.00 MF$0.65

FINAL SNAPSHOT PERFORMANCE REPORT,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 21F.
For abstract, see NSA 21 04.
NAA-SR-11934 HC$3.00 MF$0.65

NUCLEAR DESALINATION DUAL-PURPOSE PLANT CONTROL STUDIES.
Interim rept.,
Oak Ridge National Lab., Tenn.
S. J. Ball. Oct 66, 79p
Contract W-7405-eng-26

Descriptors: (*Pressurized water reactors, Control systems), (*Sea water, Desalination), Programming (Computers), Distilling plants.

For abstract, see NSA 21 04.
ORNL-TM-1618 Part I HC$3.00 MF$0.65

MATERIALS COMPATIBILITY AND CORROSION STUDIES FOR THE ARGONNE ADVANCED RESEARCH REACTOR,
Oak Ridge National Lab., Tenn.
J. C. Griess, and J. L. English. Nov 66, 42p
Contract W-7405-eng-26

Descriptors: (*Research reactors, Corrosion), (*Corrosion, Reactor materials), Beryllium, Aluminum, Stainless steel.

For abstract, see NSA 21 04.
ORNL-4034 HC$3.00 MF$0.65

CODE FLID (DEP 051). PROGRAMME NUMERIQUE ANALYSANT EN DEUX DIMENSIONS LE COMPORTEMENT THERMODYNAMIQUE D'UN LIQUIDE BOUILLANT (FLID (DEP 051). A Code for the Two Dimensional Analysis of the Thermodynamic Behaviour of a Boiling Liquid),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
Maurice Fajeau, and Jean-Pierre Saunier. Jan 67, 58p CEA-R-3141
Text in French, attached summary in English.

Descriptors: (*Reactor coolants, Boiling), (*Boiling, *Computer programs), (*Light water reactors, Computer programs), Water, Thermodynamics, Hydrodynamics, Reactor fuel elements, France.

The two-dimensional code handles the following problems: (1) Analysis of thermal and experiments on a water-loop at high or low pressure, steady state or transient behaviour. (2) Analysis of thermal and hydrodynamic behaviour of a light water reactor hot channel. The fuel elements are assumed to be flat plates. The power and pressure-drop variations during transient conditions are obtained from the complementary one-dimensional code CACTUS (see PB-173 192). (Author)
PB-174 039 HC$3.00 MF$0.65

18J. REACTOR MATERIALS

MEASUREMENT OF NEUTRON SPECTRUM, AGE, AND DIFFUSION LENGTH IN CONCRETE,
Virginia Univ., Charlottesville. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 20H.
AD-646 630 HC$3.00 MF$0.65

IRRADIATION EFFECTS ON REACTOR STRUCTURAL MATERIALS.
Quarterly progress rept., 1 Aug-31 Oct 66,
Naval Research Lab., Washington, D. C.
L. E. Steele, J. R. Hawthorne, C. Z. Serpan, Jr., and R. A. Gray, Jr. 15 Nov 66, 30p NRL-MR-1731
See also AD-639 839.

Descriptors: (*Steel, *Radiation damage), (*Reactor materials, Radiation damage), Stainless steel, Nickel alloys, Chromium alloys, Molybdenum alloys, Welds, Embrittlement, Structural parts, Ductility, Nuclear radiation.

The research program of the NRL Metallurgy Division, Reactor Materials Branch, is devoted to the determination of the effects of nuclear radiation upon the properties of structural materials. The overall program is sponsored by the Office of Naval Research, the Naval Ship Systems Command, the U. S. Atomic Energy Commission, and the Army Nuclear Power Program. Since research findings which apply to the objectives of one sponsoring agency are also of interest to the others, the overall program progress is reported herein. This report, covering research for the period 1 August - 31 October 1966, includes the following: (1) a comparative response of A302-B and several higher strength steels after irradiation at 200F and at 550F, (2) a comparative evaluation of the notch ductility of 3-1/2%Ni-Cr-Mo weld and base plate after irradiation at 200F and at 550F, (3) the notch ductility characteristics of irradiated AISI 304L and 347 stainless steels after exposure to 1 and 10 x 10 to the 19th power, (4) the response of A350-LF1 (Modified) steel to cyclic irradiation and annealing treatment, and (5) the through-thickness embrittlement and neutron flux variations in a simulated wall of a reactor pressure vessel. (Author)
AD-646 662 HC$3.00 MF$0.65

1000-MW (E) METAL-FUELED FAST BREEDER REACTOR,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 04.
ANL-7001 HC$3.00 MF$0.65

CHEMICAL ENGINEERING DIVISION SEMI-ANNUAL REPORT, JULY-DECEMBER 1965.

Argonne National Lab., Ill.
For primary bibliographic entry see Field 7A.
For abstract, see NSA 21 04.
ANL-7125 HC$3.00 MF$0.65

PHYSICS SURVEY CALCULATIONS FOR A PUO2-UO2 FUEL IN IDEALIZED H2O POWER REACTORS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
R. C. Liikala, and U. P. Jenquin. Jul 66, 24p
Contract AT (45-1)-1830

Descriptors: (*Power reactors, Reactor fuels), (*Reactor fuels, Plutonium), Reactor lattice parameters.

For abstract, see NSA 21 04.
BNWL-305 HC$3.00 MF$0.65

BURNUP DETERMINATION OF NUCLEAR FUELS.
Project rept., 1 Jan-31 Mar 66,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
William J. Maeck, and Frederick L. Lisman. Oct 66, 23p
Contract AT (10-1)-205

Descriptors: (*Reactor fuels, Fuel burn up), (*Fuel burn up, Nuclear reactors), Reactor lattice parameters, Radioactive isotopes, Uranium.

For abstract, see NSA 21 04.
IDO-14678 HC$3.00 MF$0.65

FEASIBILITY STUDY FOR FABRICATION OF CU-B4C SHEET,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 04.
LA-3570-MS HC$3.00 MF$0.65

THE MECHANICAL PROPERTIES OF DILUTE URANIUM ALLOYS AT ELEVATED TEMPERATURES.
Mallinckrodt Chemical Works, Weldon Springs, Mo. Uranium Div.
For primary bibliographic entry see Field 11F.
MCW-1505 HC$3.00 MF$0.65

MASS-TRANSFER EFFECTS IN SOME REFRACTORY-METAL-ALKALI-METAL-STAINLESS STEEL SYSTEMS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 04.
ORNL-4028 HC$3.00 MF$0.65

MATERIALS COMPATIBILITY AND CORROSION STUDIES FOR THE ARGONNE ADVANCED RESEARCH REACTOR,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 04.
ORNL-4034 HC$3.00 MF$0.65

ETUDE DES TRANSFORMATIONS ALLOTROPIQUES DU PLUTONIUM (Study of Allotropic Transformations in Plutonium),
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 11F.
PB-174 029 HC$3.00 MF$0.65

SPECULATION SUR LES DEFAUTS CRISTALLINS DANS UO2 ET UO2+x (Some Speculations Concerning Crystal Defects in UO2 and UO2+x),
Commissariat a l'Energie Atomique, Saclay France).
For primary bibliographic entry see Field 20L.
PB-174 042 HC$3.00 MF$0.65

18K. REACTOR PHYSICS

MEASUREMENT OF NEUTRON SPECTRUM, AGE, AND DIFFUSION LENGTH IN CONCRETE,
Virginia Univ., Charlottesville. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 20H.
AD-646 630 HC$3.00 MF$0.65

PHYSICS SURVEY CALCULATIONS FOR A PUO2-UO2 FUEL IN IDEALIZED H2O POWER REACTORS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 04.
BNWL-305 HC$3.00 MF$0.65

APPLICATION DE LA METHODE JANVIER (M.YVON) AUX EXPERIENCES PAR NEUTRONS PULSES (Application of the Janvier (M.Yvon) Method to Pulsed Neutron Experiments),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
Valentin Deniz. Dec 66, 34p CEA-R-3070
Text in French, attached summary in English.

Descriptors: (*Buckling (Neutron density), Mathematical analysis), (*Reactor moderators, *Neutron transport theory), Neutron spectrum, Approximation (Mathematics), Water, Graphite, Special functions (Mathematical), Distribution functions, France.

For the analysis of pulsed neutron experiments, it is important to know the extrapolation length in order to be able to evaluate the bucklings. For moderators in slab geometry, the method of Janvier is very well adapted to the application of the boundary conditions. A study of the method is reported here as applied to the pulsed neutron problem and the Milne problem in the spectral case. It is shown that the first order approximation for the angular expansion is sufficient for obtaining a good value of the diffusion cooling coefficient, even though the ultimate precision depends on the method used to study the spectrum. An expansion of the spectrum in a series of Laguerre functions of order one is considered. (Author)
PB-174 028 HC$3.00 MF$0.65

NOTION DE FONCTION DE TRANSFERT POUR UN REACTEUR NUCLEAIRE (Concept of Transfer Functions for a Nuclear Reactor),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
Abdi Dalfes. Dec 66, 25p CEA-R-3102
Text in French, attached summary in English.

Descriptors: (*Neutron transport theory, Functions), Nuclear reactors, Matrix algebra, Equations, Neutron detectors, Operators (Mathematics), France.

The solution to correlation equations are expressed in terms of the eigenvalues and eigenmatrices of the transport operator, for a subcritical zero power reactor. This allows to define, for each point of the reactor and for detectors detecting neutrons of given velocities, correlation and transfer functions driven by the same white-noise source. A precise meaning is also given to the importance operator, which is the adjoin of the transport operator. (Author)
PB-174 045 HC$3.00 MF$0.65

LA CINETIQUE DES MILIEUX HETEROGENES (Kinetics of Heterogeneous Systems),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
Valentin Deniz. Jan 67, 30p CEA-R-3080
Text in French, summary in English.

Descriptors: (*Heterogeneous reactors, *Reactor kinetics), (*Neutron transport theory, Heterogeneous reactors), Reactor lattice parameters, Buckling (Neutron density), Neutron flux, France.

A general transport theory treatment is presented for the kinetics study as applied to finite heterogeneous systems. The theory is applicable to experiments near the critical point as well as to pulsed neutron experiments on multiplying or nonmultiplying lattices. The general method is also applied to exponential experiments on infinite nondiverging lattices. (Author)
PB-174 049 HC$3.00 MF$0.65

18L. REACTORS (POWER)

1000-MW (E) METAL-FUELED FAST BREEDER REACTOR,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 04.
ANL-7001 HC$3.00 MF$0.65

ESTIMATION OF CHEMONUCLEAR PRODUCTION COSTS,
Brookhaven National Lab., Upton, N. Y.
Morris Beller, and Meyer Steinberg. Aug 66, 31p
For abstract see NSA 21 05.

Descriptors: (*Nuclear power plants, Electrochemistry), (*Sea water, Desalination), Power reactors, Costs, Light water reactors, Boiling water reactors, Turbines, Generators, Installation.
BNL-50006 (T-430) HC$3.00 MF$0.65

PHYSICS SURVEY CALCULATIONS FOR A PUO2-UO2 FUEL IN IDEALIZED H2O POWER REACTORS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 04.
BNWL-305 HC$3.00 MF$0.65

FINAL SNAPSHOT PERFORMANCE REPORT,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 21F.
For abstract, see NSA 21 04.
NAA-SR-11934 HC$3.00 MF$0.65

NUCLEAR DESALINATION DUAL-PURPOSE PLANT CONTROL STUDIES.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 04.
ORNL-TM-1618 Part 1 HC$3.00 MF$0.65

18M. REACTORS (NON-POWER)

MATERIALS COMPATIBILITY AND CORROSION STUDIES FOR THE ARGONNE ADVANCED RESEARCH REACTOR,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 04.
ORNL-4034 HC$3.00 MF$0.65

19. ORDNANCE

19A. AMMUNITION, EXPLOSIVES, AND PYROTECHNICS

STEADY-STATE CONDITIONS IN AN EXPLOSIVE WHICH IS SUBJECTED EXTERNALLY TO ELEVATED TEMPERATURES.

Technical rept.,
Picatinny Arsenal, Dover, N. J. Feltman Research Labs.
Fred P. Stein. Mar 65, 48p
PA-TR-3112

Descriptors: (*Explosive materials, Heat transfer), (*Heat transfer, Reviews), Temperature, Stability, Explosions, Lead compounds, Azides, Heat of activation, Tables, RDX, Mathematical analysis, Reaction kinetics.

A critical review of the literature on the minimum temperature for explosion is made and the more important contributions are discussed. The relative importance of the various parameters involved is given, including explosive properties and sample environment, configuration, and bulk mass. It is found that the solutions in the literature are adequate and usable although not always lucid. Several of these solutions are expanded upon and discussed in detail. Many graphical representations and examples are given to illustrate the points presented. (Author)
AD-459 600 HC$3.00

STRESS WAVES IN BOUNDED MEDIA.
Quarterly rept. 1 Sep-30 Nov 66,
Bureau of Mines, Bruceton, Pa. Explosives Research Center.
Richard W. Watson, Karl R. Becker, and Frank C. Gibson. 30 Nov 66, 25p
See also AD-636 761.

Descriptors: (*Shaped charges, Performance (Engineering)), Penetration, Detonation waves, Explosive materials, Stresses, Metal plates, Composite materials.

A program to compare the performance of 1.1-inch diameter precision shaped charge assemblies loaded with either a liquid explosive or a solid explosive was completed and is discussed in this report. It was found that the use of the liquid explosive resulted in improved performance at very long standoffs. In addition, studies related to the phenomena of detonation quenching were made, using electronic instrumentation to study the behavior of detonation waves entering a dynamically precompressed region of explosives. A marked difference was observed between the solid and liquid explosives used. Several new methods for increasing energy transfer from detonating explosives were also explored. (Author)
AD-646 495 HC$3.00 MF$0.65

INVESTIGATION OF A BIMETALLIC WIRE AS A MILLISECOND DELAY ELEMENT,
Naval Ordnance Lab., White Oak, Md. Explosion Dynamics Div.
Jerry W. Forbes. 4 Jan 67, 39p
NOLTR-66-91

Descriptors: (*Delay elements (Explosive), Wire), Time-delay fuzes, Aluminum, Palladium, Performance (Engineering).

A fuse wire composed of palladium and aluminum (pyrofuze) was investigated as a possible millisecond delay item. The single strand wire and the eight strand braid were both initiated by a constant current device. Delay times of less than 30 milliseconds were obtained from single strand bridged pyrofuze wire, while delay times above 50 milliseconds were obtained from eight strand pyrofuze braid of one- and two-inch lengths. Variations of the delay times were less than 10% when the initiating currents were maintained at 2 amperes above the threshold currents. The delay times were dependent upon the input power, particularly for the very short delay times. (Author)
AD-646 601 HC$3.00 MF$0.65

MINUTES OF THE INTERSERVICE ILLUMINATING FLARE COORDINATION CONFERENCE,
Naval Ammunition Depot, Crane, Ind.
S. M. Fasig, and C. D. Robinson. 18 Jan 67, 69p
RDTR-88
Available in black and white after original copies are exhausted.

Descriptors: (*Flares, Symposia), Parachute flares, Aircraft flares, Safety, Launching, Fuzes (Ordnance).
Identifiers: Mark 24 Flares, XM-165 Flares, XM-590 Fuzes.

The report contains the minutes of a meeting held at NAD Crane on 15 December 1966. At this meeting, design cognizant representatives from Picatinny Arsenal, Hill Air Force Base, and NAD Crane presented information relative to the effort underway on Mk 24 type flares and associated equipment to user representatives from all four services. The user representatives commented relative to present deficiencies, usage mode, and applicability of the stated design objectives. (Author)
AD-646 631 HC$3.00 MF$0.65

MICROWAVE RADIOMETRIC STUDIES IN RELATION TO MINE DETECTION,
Army Engineer Research and Development Labs., Fort Belvoir, Va.
Charles N. Johnson, Jr., and Dwight L. Gravitte. Nov 66, 89p AERDL-1875

Descriptors: (*Mine detectors, Land mines), (*Radiometers, Mine detectors), Thermal radiation, Clay, Performance (Engineering), Microwaves, Radiofrequency interference, Soils, Moisture, Temperature, Reflectivity.

Field investigations over clay-type soils of the Fort Belvoir area indicated that microwave radiometry is highly unsuitable for mine detection for the following reasons: (1) Numerous strong and highly variable radiation signals from soils almost completely mask mine detection signals even under the most favorable summer conditions. (During moist soil and thermally neutral conditions which prevail during much of the spring, fall, and winter, detection performance can be expected to deteriorate even more.) (2) Microwave radiation originates in upper 2 in. to 4 in. of soil of moderate moisture content (13 to 20 percent) because of soil attenuation. When soil moisture approaches saturation conditions (30 to 40 percent), emitted radiation is confined to surface. (3) Strong similarity exists between thermal responses of microwave radiometer and typical infrared detector to mine signals. Infrared detector offers greater potential promise because of image-forming capability obtainable with high inherent resolution of infrared compared to microwave frequencies. (Author)
AD-646 730 HC$3.00 MF$0.65

TELEMETRY RING ANTENNA,
Harry Diamond Labs., Washington, D. C.
For primary bibliographic entry see Field 9F.
AD-646 762 HC$3.00 MF$0.65

A RAPID TACTICAL MINE-PLANTING SYSTEM: HOW FORCE LEVEL AFFECTS LEVER-THROWING TIME.
Technical note,
Human Engineering Labs., Aberdeen Proving Ground, Md.
George G. Gentry, and R. Bradley Randall. Sep 66, 22p TN-8-66

Descriptors: (*Minelaying, Performance (Human)), (*Land mines, Minelaying), Operators (Personnel), Control systems, Human engineering, Motor reactions, Force (Mechanics), Time studies.

The study investigated how well manpower normally available in the field could operate the control levers of a rapid tactical mine-planting system. The subjects, who were selected to represent a normal range of arm strength, operated a control lever at force levels of 60, 80, and 100 pounds while standing on a mock-up of the mine-planter's control lever platform. The subjects were able to complete the lever push-pull cycle within a two-second time limit at force levels of 60 and 80 pounds. When the force was increased to 100 pounds, they took 3 1/2 seconds to complete the cycle. The time to complete a cycle at 100 pounds grew longer as the one-hour test period continued, but there was no such decrement at 60 and 80 pounds. Arm strength in the seated position, as measured by a push-pull gauge, did not reliably predict performance at the lever-throwing task. (Author)
AD-646 854 HC$3.00 MF$0.65

A THERMODYNAMIC FLOW ANALYSIS OF PARTICLE FORMATION EFFICIENCY IN A MIXED FLOW COLLOID THRUSTOR.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 20M.
For abstract, see STAR 05 06.
N67-16045 HC$3.00 MF$0.65

19C. COMBAT VEHICLES

EXPERIMENTAL DETERMINATION OF THE SUITABILITY OF PULSED LIGHT SYSTEMS FOR SEMIACTIVE HOMING AGAINST TANKS,
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
For primary bibliographic entry see Field 17G.
AD-646 644 HC$3.00 MF$0.65

19D. EXPLOSIONS, BALLISTICS, AND ARMOR

STEADY-STATE CONDITIONS IN AN EXPLOSIVE WHICH IS SUBJECTED EXTERNALLY TO ELEVATED TEMPERATURES.
Picatinny Arsenal, Dover, N. J. Feltman Research Labs.
For primary bibliographic entry see Field 19A.
AD-459 600 HC$3.00

TIME TO EXPLOSION FOR AN EXPLOSIVE SUBJECTED EXTERNALLY TO ELEVATED TEMPERATURES.
Picatinny Arsenal, Dover, N. J. Feltman Research Labs.
For primary bibliographic entry see Field 7D.
AD-459 649 HC$3.00

THEORETICAL AND EXPERIMENTAL STUDY OF LOW-VELOCITY PENETRATION PHENOMENA.
Final rept. May 64-Aug 66,
Utah Research and Development Co., Inc., Salt Lake City.
Emerson T. Cannon, and Palmer E. Paul. Aug 66, 152p
Contract DA-19-129-AMC-150 (X), ARPA Order-267

Descriptors: (*Armor, Shock resistance), Penetration, Computer programs, Velocity, Theory, Pressure, Stresses, Energy, Terminal ballistics, Metals, Materials, Impact.

A computer code was developed for solving impact problems. The code uses moving mass points which have all the field variables such as pressure, energy, and stress associated with the points. The

fields and their gradients determine the forces on the masses and change as the points move. The code was tested in a one-dimensional problem where it was found to produce correct results. An investigation was carried out on equations of state for materials of interest in armor development. A summary of existing data is given. A simple equation is given for the shock compression of metals and other materials and a computer code is given for calculating adiabatic expansions from a shock-compressed state. A complete report is given on an experimental program to measure material properties. The emphasis in the work is on measuring the energy involved in large-scale deformation of materials. Measurements were made by crushing disks of the test material in testing machines and by ballistic impacts. Measurements were also made on rod-to-rod impacts and on impacts of steel balls on thin plates of the test materials. Ultimate strength of materials was measured by measuring maximum acceleration of a free surface in rod-to-rod impact. (Author)
AD-646 457 HC$3.00 MF$0.65

A STUDY OF SHOCK WAVE INDUCED REACTIONS.
General Electric Co., Schenectady, N. Y. Research and Development Center.
For primary bibliographic entry see Field 21B.
AD-646 559 HC$3.00 MF$0.65

THE AIR FORCE MATERIALS LABORATORY HYPERVELOCITY BALLISTIC RANGE.
Summary rept.,
Dayton Univ., Ohio. Research Inst.
Hallock F. Swift. Jan 67, 32p
AFML-TR-67-2
Contract AF 33(615)-2040

Descriptors: (*Light gas guns, *Hypervelocity guns), (*Ranges (Establishments), Ballistics), Ordnance laboratories, Air Force research, Hypervelocity projectiles, Terminal ballistics, Instrumentation.

The light-gas gun range described in this report was constructed by University of Dayton for the Air Force Materials Laboratory. The initial capability of the range is to accelerate projectiles to peak velocities of 7.65 km/sec. The projectiles are made from materials with densities from 1 to 9 gram/cc and have a maximum size of 3.18 mm dia. Larger and higher density projectiles can be launched to somewhat lower velocities. The basic range instrumentation systems consist of a streak camera and two image converter cameras that can take high-resolution photographs of projectiles in flight. Terminal ballistic instrumentation includes: elapsed time measurement equipment, flash X-ray systems, and high resolution photography. The range has been designed in modular units and instrumentation systems have been mounted on separate bases to allow for a wide range of terminal ballistic experiments. These design features have made the range capable of accommodating several terminal ballistic studies simultaneously without reducing firing efficiency. (Author)
AD-646 760 HC$3.00 MF$0.65

THERMAL STRESSES IN A SEMI-INFINITE SOLID BY A FINITE DIFFERENCE TECHNIQUE.
Progress rept.,
Naval Applied Science Lab., Brooklyn, N. Y.
R. J. Heilferty, J. E. Koch, and M. L. Cohen. 3 Jan 67, 38p Rept. no. 9400-105, PR-4

Descriptors: (*Thermal stresses, Difference equations), (*Explosion effects, Nuclear weapons), Thermal radiation, Blast, Differential equations, Stresses, Solids, Naval research.

A system of equations is developed to provide a means of computing the stresses in a semi-infinite solid, having arbitrry properties, arising from the thermal pulse, and subsequent pressure pulse, of a nuclear weapon. Two alternate systems of finite difference equations, and the appropriate stability criteria, are developed for the computation of the one and two dimensional stress distribution in a semi-infinite body, when subjected to a temperature field within the solid, and a pressure loading on the exterior surface. These equations are developed from the exact equations of the theory of elasticity, and in order to enhance their generality and usefulness, have been written to allow for the possibility of spatially and thermally varying elastic properties. (Author)
AD-646 862 HC$3.00 MF$0.65

19F. GUNS

TORSION LEAF-SPRING PACKS.
Technical rept.,
Watervliet Arsenal, N. Y. Benet Labs.
Giuliano D'Andrea. Nov 66, 58p
WVT-6628

Descriptors: (*Guns, Springs), (*Breech mechanisms, *Springs), Design, Stresses, Torque, Torsion, Elasticity.

The report presents an analytical solution for the design of torsion leaf spring packs used in cannon breech mechanisms. It contains a quick design procedure for evaluating torque and stresses for any combination of torsion leaf spring packs, and includes experimental results to support the analytical solutions. (Author)
AD-646 385 HC$3.00 MF$0.65

PORTABLE INSTRUMENTATION LABORATORY (PORT-A-LAB).
Naval Ordnance Lab., White Oak, Md.
For primary bibliographic entry see Field 14B.
AD-646 714 HC$3.00 MF$0.65

19G. ROCKETS

PHYSICAL BASES OF ROCKET WEAPONRY.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
M. N. Aleshkov, and I. I. Zhukov. 16 Jan 67, 421p
FTD-MT-66-20
TT-67-60852
Edited machine trans. of mono. Fizicherkie Osnovy Raketnogo Oruzhiya, Moscow, 1965 464p.

Descriptors: (*Rockets, Scientific research), (*Guided missiles, Scientific research), USSR, Rocket trajectories, Guided missile trajectories, Jet propulsion, Rocket motors, Rocket propellants, Guidance, Control systems, Nuclear weapons, Aircraft ammunition, Ground support equipment, Rocket heads.

The fundamentals of the theory of flight and the physical principles of jet propulsion are presented. Rocket engines, propellants, control, and guidance of various types are described. Various rocket designs and basic assemblies are considered along with the ground equipment and test facilities. A classification of rocket weaponry is given. The information in this book is based on materials taken from the open Soviet and free-world (USA in particular) press. (Author)
AD-646 517 HC$3.00 MF$0.65

20. PHYSICS

20A. ACOUSTICS

MAGNETO-ACOUSTIC EFFECTS IN n-InSb AT 9 GHz. VOLUME XIX-2.
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
For primary bibliographic entry see Field 20L.
AD-646 478 Not available from CFSTI.

MPL ACOUSTIC TRANSPONDER.
Scripps Institution of Oceanography, San Diego, Calif. Marine Physical Lab.
For primary bibliographic entry see Field 17G.
AD-646 521 Not available from CFSTI.

A TEN-EVENT TONE-CONTROL SYSTEM FOR THE PROGRAMMING OF EXPERIMENTS.
Naval Medical Research Inst., Bethesda, Md.
For primary bibliographic entry see Field 6L.
AD-646 638 HC$3.00 MF$0.65

AERODYNAMICALLY GENERATED SOUND.
Final scientific rept.,
Toronto Univ. (Ontario). Inst. for Aerospace Studies.
H. S. Ribner. Dec 66, 26p
AFOSR-67-0278
Grant AF-AFOSR-672-66

Descriptors: (*Aerodynamic noise, Reviews), Acoustics, Sound, Refraction, Turbulence, Shock waves, Fatigue (Mechanics), Jets, Vortices, Canada.

Progress is reported on six research projects as follows: Turbulence measurements relevant to jet noise; Role of refraction in jet noise; 'Basic' directivity and spectra of jet noise; Computer study of refraction of sound by jet flow and jet temperature; Pressure fluctuations on a plate with oblique jet impingement; Distortion of a shock wave traversed by a vortex; Acoustic energy flux from shock-turbulence interaction.
AD-646 658 HC$3.00 MF$0.65

THE SONIC BOOM PROBLEM.
Deputy Chief of Staff, Research and Development (Air Force), Washington, D. C.
For primary bibliographic entry see Field 1C.
AD-646 676 HC$3.00 MF$0.65

DISTORTION OF A SHOCK WAVE TRAVERSED BY A VORTEX.
Toronto Univ. (Ontario). Inst. for Aerospace Studies.
L. T. Filotas. Jan 67, 30p UTIAS-TN-96
AFOSR-67-0127
Grant AF-AFOSR-672-64
Research supported in part by NRC, Grant A2003.

Descriptors: (*Shock waves, Distortion), (*Vortices, Shock waves), (*Aerodynamic noise, Shock waves), Geometric forms, Mathematical analysis, Interactions, Canada.

A theoretical treatment of the sound field produced upon the interaction of a vortex and a normal shock wave was presented some time ago in UTIA Report No. 61 (H.S. Ribner, 1959). The techniques of this analysis are used to derive expressions for the shape of the distorted shock front. It is found that outside of the section cut off by the cylindrical acoustic wave emanating from the vortex center, the shock remains essentially straight. The portion within this section has curvature, resulting in a finite displacement of the two straight segments. These theoretical predictions are in qualitative agreement with the features noted by experimental investigators of the same phenomenon. As no other presently published theory yields the shock wave shape, this work demonstrates the generality of the approach used. (Author)
AD-646 759 HC$3.00 MF$0.65

MEASUREMENT OF P AND S SOUND VELOCITIES UNDER PRESSURE ON LABORATORY MODELS OF THE EARTH'S MANTLE.

Lamont Geological Observatory, Palisades, N. Y.
For primary bibliographic entry see Field 8G.
AD-646 782 HC$3.00 MF$0.65

GEOMETRICAL ACOUSTICS IN MAGNETIC MATERIALS.
Interim rept.,
Stanford Univ., Calif. Microwave Lab.
B. A. Auld, and R. C. Addison, Jr. 17 Dec 65, 9p
Scientific-1, ML-1388
AFCRL-67-0025
Contract AF 19 (628)-5545
Availability: Published in IEEE Transactions on Sonic and Ultrasonics vSU-13 n3 p92-6 Aug 1966.

Descriptors: (*Magnetic materials, Acoustic properties), (*Acoustics, *Microwave frequency), Geometric forms, Anisotropy, Crystal structure, Nuclear spins, Hamiltonian, Wave functions, Vector analysis, Refraction, Focusing, Magnetic fields, Propagation.
Identifiers: Microwave acoustics.

In microwave acoustic devices there is often a need for methods of controlling the direction and shape of the acoustic beam. Two kinds of acoustic anisotropy are relevant in this problem, namely elastic anisotropy due to the crystal structure of the medium, and interaction anisotropy due to coupling of acoustic waves with other modes of the medium. A formalism for taking both of these phenomena into account is available in Hamiltonian optics. General features of this method are reviewed for acoustic propagation in a magnetic crystal where the interaction anisotropy is due to magneto-strictive coupling with spin waves. Taking the special case of a crystal with elastic isotropy, the nature of the anisotropy due to the magnetoacoustic interaction is examined. This interaction produces distortion of the wave vector surfaces for the acoustic wave, causing a deflection of the group velocity vector away from the wave vector for certain directions of propagation, and thus leading to acoustic beam steering. Another consequence of the magnetoacoustic interaction is that the wave vector surfaces for acoustic waves will vary from point to point in an inhomogeneous magnetic field. This indicates that refraction and focusing of acoustic beams may be produced, and several structures appropriate for beam focusing and defocusing are discussed. Ray path equations are used to examine the role played by interaction anisotropy in the focusing process, and also in the behavior of the focused beam at an interface. (Author)
AD-646 792 Not available from CFSTI.

TABLES OF SPHEROIDAL WAVE FUNCTIONS. PART I. OBLATE RADIAL FUNCTIONS OF THE FIRST AND SECOND TYPE.
Naval Research Lab., Washington, D. C.
For primary bibliographic entry see Field 12A.
AD-646 793 HC$3.00 MF$0.65

ATTENUATION OF SOUND BY SPHERICAL SHELLS.
Final rept.,
Michigan Univ., Ann Arbor. Cooley Electronics Lab.
Norman E. Barnett. Oct 66, 78p Rept. no. 2784-9-F
Contract Nonr-1224 (24)

Descriptors: (*Structural shells, Attenuation), (*Sound, *Attenuation), Sound transmission, Numerical analysis, Spheres, Experimental data.

The study of acoustic attenuation at low frequencies by thin spherical shells was continued beyond the initial analysis by Goodman and Stern (J. Acoust. Soc. Am., 34:338, 1962). Experimental measurements were conducted both in air and in water. Numerical evaluation was extended to include the first-order coefficient. For metallic shells immersed in either air or water, the first-order coefficient is larger than, and exhibits interesting fluctuations at lower frequencies than, the zeroth-order coefficient. As a practical consequence, pure zeroth-order behavior is difficult to observe even in the laboratory and most measurements exhibit the combined effects from several orders. (Author)
AD-646 911 HC$3.00 MF$0.65

OCTAVE AND ONE-THIRD OCTAVE ACOUSTIC NOISE SPECTRUM ANALYSIS.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
C. D. Hayes, and M. D. Lamers. 15 Jan 67, 18p
NASA-CR-81251, JPL-TR-32-1052
Contract NAS7-100
Descriptors: *Acoustic velocity, *Noise measurement, Acoustic, Analysis, Constant, Decibel, Mathematics, Measurement, Noise, Octave, Power, Pressure, Slope, Table, Technique, Velocity, Voltage.

For abstract, see STAR 05 06.
N67-16058 HC$3.00 MF$0.65

ABSORPTION OF SOUND IN AIR VERSUS HUMIDITY AND TEMPERATURE.
Columbia Univ., New York.
C. M. Harris. Jan 67, 241p NASA-CR-647
Contract NAS8-11002

Descriptors: *Atmospheric absorption, *Humidity measurement, *Sound propagation, *Temperature effect, Absorption, Acoustics, Air, Atmospheric, Attenuation, Chamber, Coefficient, Decay, Dry, Effect, Engineering, Environment, Frequency, Humidity, Measurement, Molecular, Nitrogen, Propagation, Rate, Reverberation, Room, Sound, Temperature, Test, Time.

For abstract, see STAR 05 06.
N67-16662 HC$3.00 MF$0.65

ULTRASONIC ATTENUATION IN SUPERCONDUCTING NIOBIUM.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 20C.
For abstract, see STAR 05 06.
N67-16692 HC$3.00 MF$0.65

20B. CRYSTALLOGRAPHY

FABRICATION AND PROPERTIES OF TUNGSTEN SINGLE CRYSTALS. PART I. GROWTH OF SINGLE CRYSTAL TUNGSTEN TO BE USED FOR ROLLING INTO SINGLE CRYSTAL SHEET. PART II. ROLLED SINGLE CRYSTAL TUNGSTEN SHEET.
Final rept., 1 Mar 64-26 Feb 65,
Linde Div., Union Carbide Corp., Indianapolis, Ind.
G. W. Edwards, and J. W. Arthur. 14 May 65, 94p
Contract NOw-64-0055

Descriptors: (*Tungsten, Single crystals), (*Sheets, Single crystals), (*Single crystals, Crystal growth), Metallic crystals, Material forming, Manufacturing methods, Rolling (Metallurgy), Tungsten alloys, Niobium alloys, Crystal structure, Chemical analysis, Anisotropy, Symmetry (Crystallography), Hardness, Deformation, Recrystallization, Ductility, Cold working, Heat treatment, Joining, Welding.

Effort was made to find a method for deforming single crystals of tungsten such that monocrystallinity is maintained throughout the deformation process. The technology of deformation and joining of tungsten single crystals has reached the point where simple items of hardware which retain their single crystal character can be fabricated. An item of hardware which is also a single crystal is desirable in certain applications for two reasons. The recrystallization phenomenon with its associated brittleness is absent. Thus, the single crystal will remain ductile even if heated to the melting point. Because of the single crystallinity of material, it can be welded by a state-of-the-art technique and maintain its single crystallinity even in the weld bead. Thus recrystallization and brittleness associated with weldments are also avoided. Cold deformation of tungsten single crystals requires extreme care in its present state of development. The starting single crystal boules from which billets are fabricated must be of high purity and of low dislocation concentration and lineage.
AD-464 350 HC$3.00

PARAMAGNETIC RESONANCE OF Cu (++): MgO AT 1.2K.
Minnesota Univ., Minneapolis. Dept. of Chemistry.
For primary bibliographic entry see Field 20L.
AD-646 412 Not available from CFSTI.

ELECTRON MICROSCOPE OBSERVATIONS OF QUENCHED AND AGED GOLD AND GOLD-PALLADIUM ALLOYS,
Pennsylvania Univ., Philadelphia. School of Metallurgical Engineering.
For primary bibliographic entry see Field 11F.
AD-646 455 HC$3.00 MF$0.65

NiFeCu FILMS,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
For primary bibliographic entry see Field 11F.
AD-646 481 Not available from CFSTI.

STIMULATED BRILLOUIN AND RAMAN SCATTERING IN QUARTZ AT 2.1 TO 293 KELVIN,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
P. E. Tannenwald, and J. B. Thaxter. 1966, 2p
Research supported in part by USAF.
Availability: Published in Science v154 n3754 p1319-20 Dec 9 1966.

Descriptors: (*Quartz, Scattering), Lasers, Raman spectroscopy, Brillouin zones, Excitation, Interferometers, Low-temperature research, Cryogenics, Single crystals.

Stimulated Brillouin shifts observed at 2.1K in quartz are the same as those observed at 293K. No extreme nonlinear behavior is observed. Recent anomalous results reported by Russian workers are shown to be due to the very strong stimulated Raman scattering that sets in at low temperatures. (Author)
AD-646 489 Not available from CFSTI.

RECOVERY PROCESSES AND ORDERING IN Ni3A1.
Technical rept.,
Wayne State Univ., Detroit, Mich.
Clark L. Corey, and Donnld I. Potter. Jan 67, 31p
TR-2
Contract Nonr-4520 (00)

Descriptors: (*Crystal lattice defects, Analysis), (*Intermetallic compounds, Crystal lattice defects), Dynamics, Temperature, Excitation, Spectroscopy, Annealing, Heat of activation.

Isothermal changes in long-range order, S, x-ray line shifts due to stacking faults, delta, and x-ray particle size from Fourier analysis of line shapes, D, were measured for filed samples of Ni3A1. Re-

covery temperatures between 200 degrees C. and 270 degrees C. were investigated. The recovery of all three measured properties appeared to depend upon the mobility of vacancies in this temperature range. The evaporation of vacancies from faulted loops appeared to supply the vacancy flux for ordering and particle size changes. Fault shrinkage was found to cease quite abruptly between 215 degrees C. and 200 degrees C.; at 200 degrees C. faulting initially increased, during which ordering did not occur, but after some 20 hours the faulting began to anneal out and somewhat later ordering proceeded. An activation energy of 1.65 eV was found for the ordering reaction; this compares with a value of 1.5 eV for E/vm in nickel. (Author)
AD-646 602 HC$3.00 MF$0.65

CRYSTAL CHEMISTRY STUDIES.
Pennsylvania State Univ., University Park. Materials Research Lab.
For primary bibliographic entry see Field 7B.
AD-646 603 HC$3.00 MF$0.65

CRYSTAL MORPHOLOGY AND MECHANISMS OF GROWTH OF ALPHA-Fe2O3 WHISKERS ON IRON.
Technical rept.,
Westinghouse Research Labs., Pittsburgh, Pa.
Richard L. Tallman, and Earl A. Gulbransen. 5 Dec 66, 21p TR-1, 66-9B6-SURFC-P1
Contract Nonr-4949 (00)

Descriptors: (*Iron oxides, *Whiskers (Crystals)), (*Crystal growth, Whiskers (Crystals)), Iron, Oxidation, Corrosion, Electron diffraction analysis, Electron microscopy, Diffusion, Dislocations, Crystallography.

Growths on pure iron at 400 degrees C to 500 degrees C in dry oxygen were studied. Selected area electron diffraction patterns of individual whiskers as well as electron diffraction texture patterns of oxidized surfaces showed the whisker axis to be <-1-120>. The axial rotation indicated by the pattern is that resulting from an axial twist. The axial twist provides evidence that the most simple oxide whiskers have a single axial screw dislocation with a 5.03 A Burger's vector. Arguments are presented for the view that growth of the whisker occurs by diffusion of iron atoms or ions through the dislocation and reaction with oxygen at the tip. (Author)
AD-646 646 HC$3.00 MF$0.65

TWINNING AND THE LOW TEMPERATURE MECHANICAL PROPERTIES OF POLYCRYSTALLINE COLUMBIUM, MOLYBDENUM AND CbMo ALLOYS.
Interim technical rept. 1 Feb 66-31 Jan 67,
Westinghouse Electric Corp., Pittsburgh, Pa. Research and Development Center.
B. J. Shaw. 31 Jan 67, 40p Rept. no. 67-9F7-119-R1
Contract Nonr-4442 (00)

Descriptors: (*Niobium alloys, Microstructure), (*Molybdenum alloys, Microstructure), Twinning (Crystallography), Crystal lattice defects, Radiation damage, Grain size, Cracks, Transition temperature, Mechanical properties.

Results of the mechanical tests, in compression, tension, and by stress relaxation, on columbium, neutron-irradiated and non-irradiated molybdenum, and three CbMo alloys are discussed. The tests were made in the range 200C to -269C, which covers the ductile-brittle transition temperature of all the polycrystalline materials used. The results indicate that point defects in the crystal lattice inhibit dislocation multiplication mechanisms, thereby increasing the yield and twinning stresses and enhancing the embrittlement. Etch-pit and electron microscopy studies in columbium are described. A theoretical investigation of slip on the b.c.c. (110) and (112) planes is also given.
AD-646 682 HC$3.00 MF$0.65

ELECTRON PARAMAGNETIC RESONANCE AND OPTICAL STUDIES OF IMPURITY IONS IN SINGLE CRYSTAL HOSTS.
Final scientific rept., 15 Apr 63-15 Apr 66,
Brandeis Univ., Waltham, Mass.
Paul B. Dorain. Jul 66, 116p
ARL-66-0138
Contract AF 33 (657)-11104
Availability: Published in various journals.

Descriptors: (*Impurities, Single crystals), (*Paramagnetic resonance, Impurities), Rhenium compounds, Manganese compounds, Vanadium compounds, Ions, Hyperfine structure, Absorption spectrum, Electron transitions, Cryogenics, Potassium compounds, Platinum compounds, Chlorine compounds, Tin compounds, Oxides, Sulfur compounds, Monoxides, Lithium fluorides, Copper compounds, Hamiltonian.

The electron paramagnetic resonance and optical spectra of several systems is reported. These systems are Re (+4) in K2PtCl6 single crystals, Mn (+4), and V (+4) in SnO2 single crystals, and SO gas. Complete data for each system is presented in terms of appropriate Hamiltonians. (Author)
AD-646 754 Not available from CFSTI.

CREEP OF INTRINSIC AND GALLIUM-DOPED GERMANIUM,
Michigan Technological Univ., Houghton. Dept of Metallurgical Engineering.
For primary bibliographic entry see Field 20L.
AD-646 829 Not available from CFSTI.

X-RAY SOURCE-IMAGE DISTORTION TECHNIQUE FOR THE STUDY OF CRYSTAL DISTORTION AND VIBRATION,
Georgia Inst. of Tech., Atlanta.
R. A. Young, and C. E. Wagner. 2 May 66, 7p
Contract DA-36-039-AMC-02251 (E)
See also AD-646 737.
Availability: Published in Journal of Applied Physics v37 n11 p4070-6 Oct 66.

Descriptors: (*Crystals, *X-ray diffraction analysis), Vibration, Distortion, Locus, Images.
Identifiers: Source-image distortion.

A technique is described which permits graphic display and quantitative determination of ultrasonic oscillation amplitudes, and of warping and other macroscopic strains, in crystals. An x-ray 'source image' appears superimposed on the crystal image formed by one diffracted beam from a stationary crystal. 'Source-image' distortion (SID) occurs on reflection from distorted regions of the crystal. X-ray sources ranging from 100-micron spots to 15-mm line sources interrupted by Soller slits have been used. SID photographs showing distortion produced in quartz plates by mounting clips, cements, cracks, and piezoelectric oscillations are presented. An example of direct measurement and mapping of vibrational amplitudes, e.g., 650 plus or minus A in one case, in piezoelectrically oscillating crystals is given. Oscillation mode characterization has been aided by the SID demonstration of a 180 degrees phase relation in some cases and by both SID and topographic display of the pattern of vibrational acitivity. (Author)
AD-646 864 Not available from CFSTI.

REPORT ON DEMOUNTABLE VACUUM SCANNER AND VACUUM SEALED CRYSTAL SPECIMENS FOR ELECTRONIC SCANNING.
Final rept.,
ITT Industrial Labs., Fort Wayne, Ind.
R. G. Williams. Sep 66, 39p
ARL-65-186

Descriptors: (*Electronic scanners, Vacuum apparatus), (*Crystals, Electronic scanners), Cadmium sulfides, Single crystals, Images, Photoconductivity.

Six specially processed crystals were mounted into sealed-off test envelopes and partially evaluated. Also, a demountable vacuum test head was furnished which was utilized for testing a considerable number of specially prepared crystals. (Author)
AD-646 886 HC$3.00 MF$0.65

THE MECHANICAL BEHAVIOR OF STRONTIUM ZIRCONATE.
State Univ. of New York, Alfred. Coll. of Ceramics.
For primary bibliographic entry see Field 11B.
AD-646 925 HC$3.00 MF$0.65

SPECULATION SUR LES DEFAUTS CRISTALLINS DANS UO2 ET UO2+x (Some Speculations Concerning Crystal Defects in UO2 and UO2+x),
Commissariat a l'Energie Atomique, Saclay (France).
For primary bibliographic entry see Field 20L.
PB-174 042 HC$3.00 MF$0.65

20C. ELECTRICITY AND MAGNETISM

A COMPARISON OF SEVERAL APPROXIMATIONS FOR THE DETERMINATION OF PLASMA LAYER PROPERTIES FROM THE MEASURED ELECTROMAGNETIC TRANSMISSION COEFFICIENT,
GM Defense Research Labs., Santa Barbara, Calif.
For primary bibliographic entry see Field 17D.
AD-432 026 HC$3.00

ON THE CRITICAL EFFECT OF GEOMETRIC DIMENSIONS OF EXTRACTION SYSTEMS OF A HIGH FREQUENCY PROTON SOURCE ON THE CURRENT INTENSITY OF AN ION BEAM,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 20G.
AD-440 937 HC$3.00

PROTON AND CHLORINE NUCLEAR MAGNETIC RESONANCE IN ANTIFERROMAGNETIC MnCl2.4H2O,
Michigan State Univ., East Lansing. Dept. of Physics.
For primary bibliographic entry see Field 20L.
AD-646 399 Not available from CFSTI.

ANOMALY IS SPIN-WAVE SPECTRUM OF MAGNETIC METALS.
Revised ed.,
Yeshiva Univ., New York. Belfer Graduate School of Science.
Daniel C. Mattis. 9 May 66, 4p
AFOSR-67-0108
Grant AF-AFOSR-1075-66
Revision of manuscript submitted 11 Mar 66.
Availability: Published in Physical Review v151 n1 p278-9 Nov 4 1966.

Descriptors: (*Ferromagnetic materials, *Nuclear spins), (*Band theory of solids, Ferromagnetic materials), Quantum mechanics, Magnetic materials, Functions, Momentum, Wave functions, Electron transitions, Excitation.
Identifiers: Magnons.

It is pointed out that in the band theory of magnetism the magnons have frequencies comparable to the Fermi energy. Therefore, in the calculation of the magnon spectrum of iron, nickel, cobalt, etc., it is the time- or frequency-dependent res-

ponse function of the electrons which is used, and this function-in contrast with the static response function-does not have a 'Kohn kink' at q=2kF. But it is found that in the intermediate-coupling regime (exchange force in the range EF to 4/3 EF) the magnons have a small range of momenta near q=kf where their velocities may be zero or negative, and it is shown how this part of the spectrum may be easily calculated, or approximated analytically. (Author)
AD-646 408 Not available from CFSTI.

PARAMAGNETIC RESONANCE OF Cu (++):MgO AT 1.2K.
Minnesota Univ., Minneapolis. Dept. of Chemistry.
For primary bibliographic entry see Field 20L.
AD-646 412 Not available from CFSTI.

STABILIZATION OF A MAGNETIC FIELD BASED ON NUCLEAR RESONANCE.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
A. G. Alekseev, V. M. Gerbovetskii, and I. V. Mozin. 27 Jun 66, 9p FTD-TT-65-2045
TT-67-60792
Unedited rough draft trans. of Elektrofizicheskaya Apparatura (USSR), n2 p115-9 1964.

Descriptors: (*Magnetic fields, Stabilization), (*Nuclear magnetic resonance, Sensors), Electromagnets, Control systems, Automatic, Electric currents, Signals, Circuits, USSR.

A serious shortcoming of the systems of stabilization of a magnetic field based on the use of sensors of nuclear magnetic resonances (n.m.r.) is the extremely narrow band of the capture in the system of regulation, such band constituting oersted units. In the absence of preliminary stabilization, this creates difficulties in the connecting in of the system and further, does not assure the restoration of the regime of stabilization after sharp changes in current in the electromagnet. A description is given of a system of automatic search for the signal of the sensor of n.m.r. and the capture in a regime of stabilization for a broad range of random changes in current in the electromagnet. This has made possible, without lowering the precision, the exclusion of preliminary stabilization in accordance with the current. (Author)
AD-646 454 HC$3.00 MF$0.65

POSSIBILITY OF A PHASE TRANSITION FOR THE TWO DIMENSIONAL HEISENBERG MODEL,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
H. E. Stanley, and T. A. Kaplan. 16 Aug 66, 3p
Supported by U. S. Air Force.
Availability: Published in Physical Review Letters v17 n17 p913-5 Oct 24 1966.

Descriptors: (*Ferromagnetic materials, *Phase studies), Crystal lattices, Nuclear spins, Interactions, Field theory, Transition temperature, Ferromagnetism, Theory.
Identifiers: Heisenberg ferromagnet.

It is pointed out that the existence of a phase transition--as indicated by extrapolation from high-temperature expansions--is as well-founded for two-dimensional lattices with nearest-neighbor ferromagnetic Heisenberg interactions as for three-dimensional lattices, and that the 'well-known result' that there exists no phase transition in two dimensions is not a valid conclusion from the standard spin-wave argument. (Author)
AD-646 485 Not available from CFSTI.

INTERACTION OF ELEMENTARY PARTICLES WITH A GRAVITATIONAL FIELD IN THE GENERAL THEORY OF RELATIVITY AND IN GENERALIZED LINEAR THEORY OF GRAVITATION,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 20H.
AD-646 518 HC$3.00 MF$0.65

RECOVERY PROCESSES AND ORDERING IN Ni3Al.
Wayne State Univ., Detroit, Mich.
For primary bibliographic entry see Field 20B.
AD-646 602 HC$3.00 MF$0.65

HIGH PRESSURE AND DIELECTRIC INVESTIGATIONS OF THE ALKALINE EARTH FLUORIDES.
Boston Coll., Chestnut Hill, Mass.
For primary bibliographic entry see Field 20L.
AD-646 654 HC$3.00 MF$0.65

METHOD FOR EXTENSION OF DIELECTRIC CONSTANT AND LOSS MEASUREMENTS OF LIQUIDS TO 100 MHz WITH A FIXED-GEOMETRY SAMPLE HOLDER,
Harry Diamond Labs., Washington, D. C.
For primary bibliographic entry see Field 9C.
AD-646 655 HC$3.00 MF$0.65

ELECTRICAL CONDUCTIVITY OF A PLASMA.
Brown Univ., Providence, R. I. Div. of Engineering.
For primary bibliographic entry see Field 20I.
AD-646 672 HC$3.00 MF$0.65

SURVEY OF INVESTIGATIONS OF ELECTRIC ARC INTERACTIONS WITH MAGNETIC AND AERODYNAMIC FIELDS.
Final rept.,
Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
T. W. Myers, and W. C. Roman. Sep 66, 126p
ARL-66-0184

Descriptors: (*Magnetohydrodynamics, Reviews), (*Electric arcs, Interactions), Magnetic fields, Aerodynamics, Electrodes, Flow fields, Arc heaters, Switching circuits.

The report summarizes and evaluates the existing literature related to the interaction of an electric arc at pressure levels of one atmosphere or greater with magnetic fields and/or aerodynamic fields which are transverse to the arc column. The scope of this survey does not include the subject of retrograde motion. For the purposes of this survey, the subject is broken up according to whether or not there is net arc motion with respect to the electrodes. When motion occurs, the arc is designated a travelling arc; this is the type of arc which occurs in rail accelerators, arc heaters utilizing magnetically rotated arcs and electric switchgear circuit breakers. When the arc undergoes no net motion with respect to the electrodes it is designated a stationary arc; this type occurs when the arc is balanced in a transverse gas flow by an appropriate transverse magnetic field. The report summarizes the results of the various investigations and presents them graphically for easy comparison. General conclusions which may be drawn from the investigations are presented. (Author)
AD-646 752 HC$3.00 MF$0.65

ELECTRON PARAMAGNETIC RESONANCE AND OPTICAL STUDIES OF IMPURITY IONS IN SINGLE CRYSTAL HOSTS.
Brandeis Univ., Waltham, Mass.
For primary bibliographic entry see Field 20B.
AD-646 754 Not available from CFSTI.

RESEARCH INVESTIGATION IN TRANSIENT HIGH-POWER PHENOMENA AT MICROWAVE FREQUENCIES.
Final scientific rept., 1 Feb 64-31 Oct 66,
Raytheon Co., Waltham, Mass. Research Div.
E. Schlomann, T. Kohane, J. Green, and C. Hartwig. Feb 67, 50p S-919
AFCRL-66-855
Contract AF 19 (628)-3861
Availability: Published in Journal of Applied Physics v36 n3 Pt2 p1265-6 March 1965 and v37 n3 p1069-70 March 1966.

Descriptors: (*Microwave equipment, Transients), (*Ferromagnetic materials, Transients), (*Garnet, Pumping (Electronics)), (*Pumping (Electronics), Microwave frequency), Radiofrequency power, Absorption, Nuclear spins, Hysteresis, Radiofrequency spectroscopy, X Band, Single crystals.

The time dependence of the transient absorption coefficient mu" (t) in the presence of a fast rising microwave pulse of constant amplitude was investigated for the case of parallel pumping. When the rf field amplitude is smaller than the instability threshold the absorption coefficient rises to a steady-state value of the order of 0.0001, which agrees quantitatively with theoretical predictions. When the rf field amplitude is larger than the instability threshold, the absorption coefficient at first rises to an intermediate plateau, remains substantially constant for a time of the order of 10 - 60 microsec (depending on the rf level) and then increases again to a significantly higher plateau. It is found that at the intermediate plateau the rf field amplitude in the cavity is very nearly equal to the critical field. An intermediate plateau occurs only at dc fields less than approximately 1400 Oe (for YIG at X-band). In the same field range the critical field determined by a cw technique shows hysteresis. Both these effects are attributed to a nonlinearity of the spin-wave damping due to 3-magnon confluence processes. The observed time dependence of the transient absorption coefficient has been compared to theoretical predictions. Reasonably good agreement is obtained if allowance is made for the reaction of the sample upon the cavity field and the nonlinearity of the spin-wave damping. (Author)
AD-646 776 Not available from CFSTI.

GEOMETRICAL ACOUSTICS IN MAGNETIC MATERIALS.
Stanford Univ., Calif. Microwave Lab.
For primary bibliographic entry see Field 20A.
AD-646 792 Not available from CFSTI.

ABSORPTION SPECTRA OF MnF2, KMnF3, RbMnF3, AND CsMnF3,
McGill Univ., Montreal (Quebec). Eaton Electronics Research Lab.
For primary bibliographic entry see Field 20F.
AD-646 821 Not available from CFSTI.

ON THE BULK (H sub c2) AND SURFACE (H sub c3) NUCLEATION FIELDS OF STRONG COUPLING SUPERCONDUCTING ALLOYS.
Technical rept.,
Cornell Univ., Ithaca, N. Y. Lab. of Atomic and Solid State Physics.
Gert H. U. Eilenberger, and Vinay Ambegaokar.
Jan 67, 33p TR-17
Contract Nonr-401 (38)

Descriptors: (*Superconductors, *Nucleation), (*Magnetic fields, Superconductors), Differential equations, Alloys, Field theory.

The linearized self consistency equation, in the electron phonon model, for the nucleation of superconductivity in the presence of a magnetic field was studied. It was found that near the transition temperature this integrodifferential equation is susceptible to analysis. The main results were that the ratio of surface to bulk nucleation fields was predicted to have the weak coupling value of 1.695, thus not confirming a recent experimental

suggestion of a value near 1.9 for strong coupling superconductors. The slope (differential H sub c3/differential T) sub T sub c was worked out both in terms of integrals over the parameters of the bulk strong coupling theory and in terms of other experimental quantities. Comparison of this last result with existing experiments on pure lead was attempted, with good success. An implicit equation for H sub c2 (T) for all T was derived, but the numerical work necessary to solve this equation was not undertaken. (Author)
AD-646 909 HC$3.00 MF$0.65

A NEW NEAR-ZONE ELECTRIC FIELD-METER.
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 14B.
NBS-TN-345 HC$0.35 MF$0.65

ULTRASONIC ATTENUATION IN SUPERCONDUCTING NIOBIUM.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
J. H. Simmons. Jan 67, 30p NASA-TN-D-3817
Contract 129-02-05-02-22

Descriptors: *Niobium, *Superconductor, *Ultrasonic wave, Anisotropy, Attenuation, Crystal, Field, Longitudinal, Magnetic, Metal, Ultrasonic, Wave.

For abstract, see STAR 05 06.
N67-16692 HC$3.00 MF$0.65

EXISTENCE ET STRUCTURE DES MONOCARBURES DE TERRES RARES: ETUDE DE LEURS PROPRIETES MAGNETIQUES A BASSES TEMPERATURES (Existence and Structure of Rare-Earth Monocarbides: Study of their Low Temperature Magnetic Properties).
Commissariat a l'Energie Atomique Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 7B.
PB-174 030 HC$3.00 MF$0.65

TRANSITION SUPRACONDUCTRICE ET MAGNETORESISTANCE EN CHAMP FAIBLE D'UN ECHANTILION MONOCRISTALLIN DE NIOBIUM A 4,2K (Superconductive Transition and Low-Field Magnetoresistance of a Niobium Single Crystal at 4.2K),
Commissariat a l'Engergie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
Gaston Perriot. Jan 67, 61p CEA-R-3149
Text in French, summary in English.

Descriptors: (*Niobium, Electromagnetic properties), (*Superconductivity, Niobium), Single crystals, Magnetic properties, Resistance (Electrical), Cryogenics, Transition temperature, Electric currents, Crystal structure, France.
Identifiers: Magnetoresistive effect.

A report is given of the study of the electrical resistance of a niobium single crystal, at 4.2K, from the beginning of the superconductive transition to 80 kilooersteds. Critical fields Hc2 and Hc3 were determined. Influences on superconductive transition of current density, field-current angle, crystal orientation and magnetoresistance were studied. Variation laws of low-field transverse and longitudinal magnetoresistances were determined. (Author)
PB-174 041 HC$3.00 MF$0.65

20D. FLUID MECHANICS

A NEW TECHNIQUE FOR THE NUMERICAL ANALYSIS OF NONEQUILIBRIUM FLOWS.
General Applied Science Labs., Inc., Westbury, N. Y.
For primary bibliographic entry see Field 1A.
AD-466 922 HC$3.00 MF$0.65

HEAT-TRANSFER AND SHEAR BETWEEN COAXIAL CYLINDERS FOR LARGE KNUDSEN NUMBERS.
California Univ., Berkeley. Inst. of Engineering Research.
For primary bibliographic entry see Field 20M.
AD-469 851 HC$3.00 MF$0.65

A SURVEY STUDY ON THE EFFECTS OF VIBRATIONS, SOUND FIELDS AND PULSATIONS ON HEAT AND MASS TRANSFER FROM FLAT PLATES, CYLINDERS AND DUCTS.
Final rept.,
Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
M. Anandha Rao. Oct 65, 66p ARL-65-217

Descriptors: (*Transport properties, *Heat transfer), Vibration, Sound, Flat plate models, Cylindrical bodies, Ducts, Fluid mechanics, Fluid flow, Kinetic theory, Oscillation, Boundary layer, Turbulence, Convection (Heat transfer), Surface properties, Acoustic properties, High-pressure research, Mass transfer.

A review on the effects of unsteady flow generated by vibrations, pulsations and sound fields on the rate of heat and mass transfer is presented. The different studies are reviewed after classifying them in an orderly manner. An extensive bibliography is presented at the end wherein the references are arranged in alphabetical order of the author, also a subject guide to the bibliography is presented. (Author)
AD-475 428 HC$3.00 MF$0.65

A 56-MOMENT SYSTEM OF DIFFERENTIAL KINETIC EQUATIONS.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 20M.
AD-646 375 HC$3.00 MF$0.65

THE VELOCITY OF SMALL PERTURBATIONS AND THE EXISTENCE OF WEAK SHOCK WAVES IN A RADIATING GAS TAKING INTO ACCOUNT RADIATION PRESSURE.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
V. A. Prokofev. 8 Aug 66, 29p FTD-MT-65-234
TT-67-60772
Edited machine trans. of Moscow Univ. Vestnik. Seriya 1: Matematika, Mekhanika (USSR), v15 n1 p43-59 1960.

Descriptors: (*Shock waves, Turbulence), Thermal radiation, Velocity, Perturbation theory, Gases, Propagation, Pressure, USSR.

On the basis of hydrodynamic equations of Navier-Stokes, taking into account the mechanical action of equilibrium radiation, consideration is given to propagation of plane harmonic weak perturbations (pressure waves and thermal waves) in equilibrium medium at rest, thermal and calorific state of which are given in very general form. There is obtained a formula for adiabatic speed of sound, taking into account radiation pressure, and the characteristic (frequency) equation of the Kirchhoff-Langevin type. (Author)
AD-646 380 HC$3.00 MF$0.65

FLUTTER PLATES SITUATED IN THE FIELD OF TEMPERATURE ACTION.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
S. A. Ambartsumyan, and G. E. Bagdasaryan. 29 Jul 66, 13p FTD-TT-65-2005
TT-67-60773
Unedited rough draft trans. of Akademiya Nauk Armyanskoi SSR, Erevan. Doklady, v39 n3 p141-7 1964.

Descriptors: (*Flutter, Supersonic flow), Flat plate models, Aerodynamic configurations, Velocity, Temperature, USSR.

The critical velocity of flutter is determined mathematically.
AD-646 384 HC$3.00 MF$0.65

SPLITTER EFFECT IN CONICAL DIFFUSERS. PART III. COMPRESSIBILITY EFFECT. PART IV. PRESSURE DISTRIBUTION.
Technical rept.,
Clemson Univ., S. C. Engineering Experiment Station.
Tah-teh Yang, Charles E. Kirkwood, and Hal O. Jones. Nov 66, 68p Bull-108
AROD-4390.5-E
Contract DA-31-124-ARO (D)-148
See also AD-615 573, AD-644 905.

Descriptors: (*Diffusers, Conical bodies), Airfoils, Pressure, Efficiency, Compressive properties, Rings, Subsonic flow, Mach number.
Identifiers: Splitter effect.

An investigation was made concerning the effect of inlet velocity on the pressure recovery efficiency of a subsonic conical diffuser with and without a ring-airfoil installed. Three diffusers and two ring-airfoils were tested over a range of inlet Mach Number 0.30< or ± M< or ± 0.70. The conclusions reached for diffusers with and without ring-airfoils are: (1) the compressibility (Mach Number) effect is small compared to the Scaling (Reynolds Number) effect, (2) there is an optimum Mach Number for each diffuser at which the pressure recovery efficiency is a maximum, and (3) pressure recovery efficiency variation with respect to Mach Number ranged from 3 to 7% over the range .25< or ± M< or = .70. Experimental results are presented for conical diffusers with and without a ring-airfoil mounted. (Author)
AD-646 397 HC$3.00 MF$0.65

AN INVESTIGATION OF THE HEAT TRANSFER ASPECTS OF HORIZONTAL TWO-PHASE FLOW.
Final rept.,
Cornell Univ., Ithaca, N. Y. Sibley School of Mechanical Engineering.
H. N. McManus, Jr. 10 Nov 66, 8p
AROD-3199.3
Grant DA-ARO (D)-31-124-G188

Descriptors: (*Two-phase flow, *Heat transfer), Scattering, Fluid dynamic properties, Shear stresses, Nozzle gas flow, Aerosols.

The research has as its purpose the study of the heat transfer aspects of two-phase flow and the associated fluid dynamics. A major portion of the effort was directed toward the understanding of the fluid dynamics and heat transfer in constant area horizontal annular two-phase flow. The heat transfer and fluid dynamics aspects of dispersed flows in contracting sections were also under examination. (Author)
AD-646 398 HC$3.00 MF$0.65

ON THE FORMULATION OF TWO DIMENSIONAL EDDY CURRENT PROBLEMS OF A COMPRESSIBLE LIQUID IN TURBOMACHINES.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
Ya. A. Sirotkin. 14 Jul 66, 19p FTD-TT-65-1924
TT-67-60776
Unedited rough draft trans. of Inzhenernyi Zhurnal (USSR), v4 n2 p254-62 1964.

Descriptors: (*Fluid flow, *Turbines), Compressible flow, Machines, Two-dimensional flow, Liquids, USSR, Turbulence.

The fluid dynamic properties of the eddy current are treated mathematically.
AD-646 419 HC$3.00 MF$0.65

IGNITION OF A STOICHIOMETRIC MIXTURE IN A LAMINAR SUPERSONIC BOUNDARY LAYER OF A FLAT PLATE,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 21B.
AD-646 426 HC$3.00 MF$0.65

REDUCTION OF DRAG OF A PROJECTILE IN A SUPERSONIC STREAM BY THE COMBUSTION OF HYDROGEN IN THE TURBULENT WAKE,
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
W. T. Baker, T. Davis, and S. E. Matthews. 4 Jun 51, 29p CM-673
Contract NOrd-7386

Descriptors: (*Projectiles, Drag), (*Hydrogen, Combustion), Supersonic flow, Reduction, Wake, Turbulence, Flight, Air.

An experimental evaluation was made of the effect of combustion of hydrogen with the wake air on the drag of a projectile. The base drag was reduced by about two-thirds, and hence total drag of a flight unit may possibly be reduced one-third, by the use of a minimum of 6.4 per cent of the stoichiometric requirement of the air swept by the maximum cross-sectional area. No difficulty was experienced in igniting the hydrogen. From data obtained from Experiment Incorporated it appears that a solid fuel charge might be employed to achieve this drag reduction for a projectile in flight. The use of a pyrotechnic magnesium charge in the form of a cylinder attached to the base of a projectile would require consumption at the rate of 0.17 inch per second at sea level to achieve the same heat release. The burning rate is approximately proportional to pv, tending to maintain combustion temperature during variations of altitude and speed. (Author)
AD-646 436 HC$3.00 MF$0.65

MILLIMETER ELECTRON PARAMAGNETIC RESONANCE IN STRONTIUM TITANATE.
Syracuse Univ., N. Y. Dept. of Physics.
For primary bibliographic entry see Field 20L.
AD-646 439 HC$3.00 MF$0.65

ADIABATIC MOTIONS OF AN IDEAL GAS WITH SHOCK WAVES OF HIGH INTENSITY ONE-DIMENSIONAL UNSTEADY MOTIONS,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
G. G. Chernyi. 20 Sep 66, 30p FTD-TT-65-1316 TT-67-60791
Unedited rough draft trans. of Akademiya Nauk SSSR. Otdelenie Tekhnicheskikh Nauk. Izvestiya, n3 p66-81 1957.

Descriptors: (*Adiabatic gas flow, Shock waves), Motion, One-dimensional flow, Intensity, Equations of motion, USSR.

A method is presented of calculating approximately unsteady one-dimensional gas flows with shock waves of high and moderate intensity, a method which is based on representing the solution to the equations of motion in the form of power series. (Author)
AD-646 453 HC$3.00 MF$0.65

ON THE COMPUTATION OF FLOW AT LARGE KNUDSEN NUMBERS,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
M. N. Kogan, and L. M. Degtyarev. 14 Jul 66, 21p FTD-TT-65-1959 TT-66-10831
Unedited rough draft trans. of Astronautica Acta (Austria), v11 n1 p36-42 1965.

Descriptors: (*Superaerodynamics, Moments), Knudsen number, Mathematical analysis, Monte Carlo method, Boundary layer, Molecules, USSR.

A method is presented for the numerical solution of the Boltzmann Equation which seems to have some advantages over the usual method of moments. The formative influences on molecular flow are discussed and examples of the calculation are given for flows close to free-molecular flow with the Monte-Carlo-method. The results of the calculation confirm the existence of the molecular boundary layer. (Author)
AD-646 460 HC$3.00 MF$0.65

GESTALTSAUSSAGEN UBER DISSOZIIERTE UND ANDERE CHEMISCH REAGIERENDE ZWEISTOFFGRENZCHICHTEN (Concepts Concerning Dissociating and Other Chemicilly Reacting Binary Boundary Layers),
Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, e.V., Freiburg im Breisgau (West Germany).
E. Adams. 1966, 14p
Text in German.
Availability: Published in Zeitschrift fur Angewandte Mathematik und Mechanik (ZAMM) v4 n3/4 p167-78 1966.

Descriptors: (*Laminar boundary layer, Fluid dynamic properties), Chemical reactions, Dissociation, Transport properties, Thermodynamics, Stagnation point, Flow separation, Velocity, West Germany.

By use of Nirenberg's maximum principle for parabolic differential operators, generally valid conclusions are derived for chemically reacting binary non-stationary laminar compressible boundary layer flows with arbitrary thermodynamic and transport properties and arbitrary distributions of pressure, mass transfer, and heat transfer. E. g., for dissociated air (as a Lighthill-gas) or for the injection of a foreign gas, the following results are predominant: (1) bounds for the mass concentrations are derived for thermodynamic equilibrium, for frozen boundary layer flows, and for certain non-equilibrium stagnation point flows. (2) Separation is governed by the pressure gradient only. (3) If the speed of sound at outer edge of the boundary layer tends to zero, the velocity component u cannot take a maximum or a minimum inside the boundary layer. (Author)
AD-646 474 Not available from CFSTI.

STABILITAT UND VERZWEIGUNG STATIONARER LOSUNGEN DER NAVIER-STOKESCHEN GLEICHUNGEN BEIM TAYLORPROBLEM (Stability and Ramifications of Fixed Solutions of Navier-Stokes Equations for Taylor Problems),
Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, e.V., Freiburg im Breisgau (West Germany).
W. Velte. 17 Jan 66, 15p
Text in German.
Availability: Published in Archive for Rational Mechanics and Analysis v22 n1 p1-14 1966.

Descriptors: (*Fluid flow, Mathematical analysis), Partial differential equations, Gas flow, Couette flow, Functions, Stability, West Germany.

Contents: Statement of the problem; Choice of function spaces; Existence of Eigenvalues and calculation of its variations.
AD-646 475 Not available from CFSTI.

INDUSTRIAL AERODYNAMICS, NO. 23, 1962: SELECTED ARTICLES,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
G. L. Grodzovskii, L. I. Iliazarova, and A. S. Ginevskii. 20 Sep 66, 94p FTD-TT-65-1971 TT-67-60795
Unedited rough draft trans. of Promyshlennaya Aerodinamika (USSR), n23 p66-71, 107-65 1962.

Descriptors: (*Aerodynamics, Scientific research), Laminar flow, Turbulence, Axially symmetric flow, Momentum, Velocity, Partial differential equations, Wind tunnels, Wind, Nozzles, Pressure, Temperature, Viscosity, Jets, Prandtl number, USSR.

Content: Propagation of laminar and turbulent axisymmetric fanshaped flows in immersed space; An experimental investigation of flow in the free stream; Escape of a free turbulent stream into a moving medium. (Author)
AD-646 499 HC$3.00 MF$0.65

THE GROWTH OF A TURBULENT WAKE IN A DENSITY-STRATIFIED FLUID.
Technical rept.,
Hydronautics, Inc., Laurel, Md.
Walter P. M. van de Watering. Nov 66, 56p TR-231-12
Contract Nonr-3688 (00)

Descriptors: (*Wake, *Turbulence), Fluids, Density, Fluid dynamic properties.
Identifiers: Stratified media.

The force of gravity causes a turbulent wake in a density-stratified fluid to eventually cease its vertical growth and then to collapse towards its horizontal midplane. In the present investigation this phenomenon was studied experimentally. The turbulent wake was created by means of a spiral paddle, agitated by a pendulum-type arrangement outside a transparent lucite tank. Data were obtained from tracings of the motion pictures taken by a 16 mm movie camera. Both the pendulum arrangement and the paddle diameter were varied to find the possible influence of the experimental conditions. It was observed that the initial rate of growth in the vertical direction is constant, depending primarily on the density gradient and the agitation mechanism (i.e. pendulum and paddle diameter). This initial rate of growth of the wake, the maximum vertical thickness of the wake, the time at which collapse begins and the turbulence intensity within the wake at that time, were all correlated with the Vaisala frequency, resulting in three important constants which seemed to be independent of the experimental conditions. (Author)
AD-646 503 HC$3.00 MF$0.65

THE LINEARIZED RAYLEIGH PROBLEM IN A RAREFIED GAS FLOW ACCORDING TO THE BGK MODEL.
Final Scientific rept.,
Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
K. S. Nagaraja. Sep 66, 103p ARL-66-0186
Doctoral thesis.

Descriptors: (*Superaerodynamics, Mathematical analysis), Linear systems, Mathematical models, Rayleigh waves, Kinetic theory, Integral equations.

The classical Rayleigh problem was formulated using the BGK kinetic equation, and the numerical evaluation is carried out on an IBM 7094. The results describe the macroscopic velocity q sub x, the shear stress P sub xy, the tangential heat flux Q sub x, and the temperature field T' in the near-free-molecule flow. These results are obtained for a wide range of values of lambda t (the number of inter-molecular collisions in a time t). The flow picture is physically plausible, and agrees in regions of common validity with other available results. For example, the velocity-slip on the surface, which is half of the impulsive velocity, V,

in the free-molecule limit, decreases with increasing collision numbers (lambda t), and finally vanishes in the Rayleigh limit (or the continuum limit). The boundary layer thickness also decreases with increasing lambda t. The initial formulation of the problem involves only the first power of q sub x which is much smaller than the local speed of sound. Using a higher approximation by retaining the (q sub x) squared term, the temperature fields are obtained for the near-free-molecule flow. In further work it is proposed to use these results so that the compressibility effects may be included through an iteration scheme. (Author)
AD-646 558 HC$3.00 MF$0.65

A STUDY OF SHOCK WAVE INDUCED REACTIONS.
General Electric Co., Schenectady, N. Y. Research and Development Center.
For primary bibliographic entry see Field 21B.
AD-646 559 HC$3.00 MF$0.65

DRAG MEASUREMENTS IN A STREAM WITH SINUSOIDALLY FLUCTUATING VELOCITY IN THE LONGITUDINAL DIRECTION,
Army Aviation Materiel Labs., Fort Eustis, Va.
Clifton G. Wrestler, Jr. Nov 66, 34p
USAAVLABS-TR-66-89

Descriptors: (*Drag, Structural parts), (*Gust loads, Drag), Aerodynamic loading, Turbulence, Measurement, Velocity, Gas flow, Cylindrical bodies, Flat plate models, Wind tunnel models.

The drag coefficients of cylinders and plates in a stream with sinusoidal fluctuations in velocity are investigated. A tube with counterrotating vanes at the rear is used to produce the flow fluctuations. This tube was placed in the open jet of a low speed tunnel. The models were mounted on a vertical sting, which supported the one-component force transducer. The drag coefficients, based on average values of drag and dynamic pressure, show no variation with frequency parameter changes. The fluctuating component of drag does show a dependence on the frequency parameter. Also, a phase shift is noticed between the velocity and the force. (Author)
AD-646 643 HC$3.00 MF$0.65

A CONTRIBUTION TO THE THEORY OF JET-WAKES AND VORTICES IN FREE AND CONFINED SURROUNDINGS.
Research rept.,
Mississippi State Univ., State College. Dept. of Aerophysics.
George Basil Fragoyannis. Nov 66, 123p
Aerophysics RR-67
USAAVLABS-TR-66-69
Contract DA-44-177-AMC-264 (T)

Descriptors: (*Wake, Flow fields), (*Vortices, Flow fields), (*Jets, Wake), Incompressible flow, Turbulence, Viscosity, Equations of motion, Jet pumps, Laminar flow, Theory, Axially symmetric flow.

Starting with an extensive account of the present ideas and development on the subject flows, the general principles of the motion of a free laminar jet were analyzed and reviewed. From these principles an understanding of the very complex behavior of a turbulent jet was obtained. Using a linearized form of the Navier-Stokes equations of motion, a set of solutions capable of describing the laminar axial, rotational, and radial velocity profiles of a jet was deduced. Next, it was indicated that by introducing a 'viscosity function' to the simplified equations of laminar motion, solutions of the same general analytic form, but with a different nondimensional variable, can be obtained to describe the turbulent motion. On the basis of the presented theoretical analysis and available experimental results, it was concluded that the laws describing jet-wakes and vortices for laminar and turbulent motion are of the same general nature. (Author)
AD-646 656 HC$3.00 MF$0.65

AERODYNAMICALLY GENERATED SOUND.
Toronto Univ. (Ontario). Inst. for Aerospace Studies.
For primary bibliographic entry see Field 20A.
AD-646 658 HC$3.00 MF$0.65

HYPERSONIC FLOW OF BLUNT DELTA WINGS AT LOW ANGLES OF ATTACK. I. SHOCK WAVE SHAPE AND SURFACE PRESSURE DISTRIBUTION.
Final rept.,
ARA, Inc., West Covina, Calif.
Bernard Mazelsky, and M. Liu. Nov 66, 62p
ARA-81
AFOSR-67-0005
Contract AF 49 (638)-1309

Descriptors: (*Delta wings, Aerodynamic characteristics), (*Aerodynamic characteristics, Swept wings), Supersonic flow, Hypersonic flow, Mach number, Angle of attack, Shock waves, Wind tunnels, Lift, Drag, Blunt bodies, Aerodynamic configurations.

This report covers a portion of a research program on the aerodynamic characteristics of a cylindrical-leading-edge 70 degrees swept delta wing at high supersonic and moderate hypersonic Mach numbers, and for small values of angle of attack. Prior to the calculation of the lift and drag characteristics of the wing, a semi-empirical method was developed to predict the shock wave shape surrounding the wing as well as the corresponding pressure distribution on the wing surface. The theoretical shock shape and pressure distribution results are compared with experiments available from the open literature as well as with experimental pressure distributions obtained in the present program on the tip portion of a blunt 70 degrees swept delta wing. Within the range of applicability of the semi-empirical method, the predicted shock wave shapes are in good agreement with experiment. The calculated pressure distributions agree quite well with experiment, provided the angle of attack is below 15 degrees and the Mach number is above M = 3.0.
AD-646 665 HC$3.00 MF$0.65

STANTON TUBE CALIBRATION IN A LAMINAR BOUNDARY LAYER AT MACH 6,
California Inst. of Tech., Pasadena.
John E. Lewis, and Toshi Kubota. 24 Aug 66, 2p
Contract DA-31-124-ARO (D)-33
Availability: Published in AIAA Journal v4 n12 p2251-2 1966.

Descriptors: (*Laminar boundary layer, *Probes), Calibration, Pressure, Skin friction.
Identifiers: Stanton tube.

Calibration procedures are described based on a measured 'Stanton tube pressure' and the theoretically calculated skin friction.
AD-646 707 Not available from CFSTI.

HYDRODYNAMIC ANALYSIS OF THE AN/SSQ-41 SONOBUOY HYDROPHONE SUSPENSION SYSTEM.
Naval Air Development Center, Johnsville, Pa. Aero-Electronic Technology Dept.
For primary bibliographic entry see Field 17A.
AD-646 715 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATION OF THE DENSITY FLOW FIELD IN THE STAGNATION REGION OF A BLUNT BODY IN HIGH SPEED RAREFIED FLOW,
Celestial Research Corp., South Pasadena, Calif.
J. B. Wainwright. Nov 66, 72p BD-339-101
Contract NOw-66-0224

Descriptors: (*Superaerodynamics, Blunt bodies), (*Stagnation point, Flow fields), (*Flow fields, *Blunt bodies), Density, High altitude, Flight, Shock waves, Air, Nitrogen.

The evolution of shock structure in the stagnation region of spheres was experimentally investigated in air and nitrogen flows at normal Mach number 6 and a Reynolds number range, based on sphere radius and viscosity behind a shock, between 1.7 and 69. The electron beam fluorescence technique was used to measure density in the region between the surface and one radius away from the surface and at angular displacements up to 40 degrees from the stagnation line. Model wall temperatures were held at adiabatic and .28 of adiabatic. Results at the lowest Reynolds number show agreement with free molecule theory when modified to account for single collisions between free stream molecules and those emitted from the model. As density is increased a progressively longer mean free path than that calculated for the free stream and emitted molecules is required to correlate the data. At Re sub s of 20 a shock structure begins to appear but is completely merged with the body influence. The maximum slope thickness of the primitive shock, relative to the mean free path behind the fully developed shock, ranges from 70% to 92% of the fully developed shock thickness for $12 < Re_{sub\ s} < 69$. (Author)
AD-646 743 HC$3.00 MF$0.65

EFFECTS OF FOREIGN GAS INJECTION ON LAMINAR BOUNDARY LAYER STABILITY AT LOW MACH NUMBERS.
Final rept.,
Naval Ordnance Lab., White Oak, Md.
John O. Powers, and Lorenzo M. Albacete. 12 Sep 66, 28p NOLTR-66-155, Aerodynamics Research-266

Descriptors: (*Laminar boundary layer, Stability), (*Gases, Injection), Transport properties, Air, Helium, Carbon tetrachloride, Temperature, Mach number.

The stability characteristics of laminar boundary layer profiles including foreign gas injection were evaluated by solving the disturbance equations for the eigenvalues which define the minimum critical Reynolds number for neutral stability. The profiles utilized demonstrate the differences which accrue from using light and heavy molecular weight gases as the injectant. Results obtained by asymptotic procedures for Mach numbers less than 1.3 show that the heavier gas (carbon tetrachloride) resulted in markedly more stable boundary layers than a lighter gas (helium). (Author)
AD-646 747 HC$3.00 MF$0.65

THE NOL BOUNDARY LAYER CHANNEL,
Naval Ordnance Lab., White Oak, Md.
For primary bibliographic entry see Field 14B.
AD-646 748 HC$3.00 MF$0.65

NONLINEAR BUBBLE OSCILLATIONS,
California Inst. of Tech., Pasadena. Div. of Engineering and Applied Science.
Louis P. Solomon, and Milton S. Plesset. Jan 67, 22p Rept. no. 85-38
Contract N00014-67-0094-0009

Descriptors: (*Bubbles, *Oscillation), Numerical analysis, Cavitation, Compressive properties, Pressure, Nonlinear systems.

Numerical solutions were obtained for the motion of a gas bubble in an incompressible liquid when harmonic pressure oscillations are imposed. The mean pressure in the liquid was taken to be 1 atm and the ratio of oscillating pressure amplitude, A, to the mean pressure was given the values 0.2, 0.5, 1.0 and 2.0. The equilibrium bubble radius was

chosen to be R sub o = .01, .001 and, .0001 cm, and the angular frequency of the pressure variations was omega = 20,000, 70,000, and 120,000 per sec. The phenomena of bubble 'explosion' or 'collapse' were found for large A, i.e., 1.0 and 2.0. For the smaller values of A, the bubble radius varied with time within well-defined limits, but nonlinear effects were evident. (Author)
AD-646 755 HC$3.00 MF$0.65

DISTORTION OF A SHOCK WAVE TRAVERSED BY A VORTEX.
Toronto Univ. (Ontario). Inst. for Aerospace Studies.
For primary bibliographic entry see Field 20A.
AD-646 759 HC$3.00 MF$0.65

A THEORETICAL AND EXPERIMENTAL STUDY OF THE FLUID MOTION ABOUT A FLAT PLATE ROTATED IMPULSIVELY FROM REST TO A UNIFORM ANGULAR VELOCITY.
Final rept.,
Nebraska Univ., Lincoln. Dept. of Mechanical Engineering.
T. Sarpkaya. Dec 66, 28p NU-Hydro-027-TS
Contract Nonr-3718 (03)

Descriptors: (*Flat plate models, Fluid flow), Fins, Ailerons, Fluid dynamic properties, Incompressible flow, Oscillation, Torque, Angle of attack, Flow separation, Rotation.

The report presents the results of an experimental and theoretical investigation of separated unsteady flow about a flat plate (a fin or aileron) rotating impulsively from rest to a uniform angular velocity about an axis along its leading edge in an incompressible fluid otherwise at rest or moving steadily and uniformly about the plate. The results show that the early stages of motion are accompanied by torsional oscillations, the frequency of which is identical with the natural frequency of the submerged system. The initial hydrodynamic torque is determined by the added mass-moment of inertia of the plate. In the oscillatory stage of motion the torque is comprised of an angular-velocity-dependent form-torque and an acceleration-dependent inertial torque. These torque components are interdependent as well as time-dependent. The rotation of the plate in a steady uniform flow gives rise to a hinge moment which is considerably larger than that of a plate held fixed at the same instantaneous angle of incidence. (Author)
AD-646 834 HC$3.00 MF$0.65

SOUND-RECEPTION AND FLOW-NOISE OF SIMPLE LINES AND PERFORATED PIPES IN MOTION.
Raytheon Co., Bedford, Mass. Missile Systems Div.
For primary bibliographic entry see Field 17A.
AD-646 861 HC$3.00 MF$0.65

ON THE SURFACE WAVE PATTERN OF SUBMERGED BODIES ARRESTED IMPULSIVELY FROM UNIFORM MOTION.
Technical rept.,
Hydronautics, Inc., Laurel, Md.
C. C. Hsu. Nov 66, 21p TR-231-14
Contract Nonr-3688 (00)

Descriptors: (*Underwater objects, *Water waves), Motion, Hydrodynamics, Surfaces, Deceleration, Mathematical analysis.

A theoretical study on the surface wave pattern of submerged bodies arrested impulsively from uniform motion was carried out. Seen from above, the waves appear to pass through the suddenly stopped body, fading away in the foremost portion of the pattern. The extent of this disappearing wave front in advance of the stopped body is approximately equal to 1/2 Ut, where U is the constant speed which the body originally possessed, and t the time elapsed since the sudden alteration in motion took place. If the transient effect is negligible, i.e., for a sufficiently long time t, except for the disappearing wave front, the group of steady regular waves, produced by the initially moving submerged body, advances into still water within a V-shaped region as if no changes had taken place. The front portion of this wave pattern becomes blunter as the elapsing time increases, due to the disappearing wave front. The location of the motionless body may be determined from the wave pattern by simple arithmetic calculations. (Author)
AD-646 887 HC$3.00 MF$0.65

SMALL MOTIONS SUPERPOSED ON LARGE STATIC DEFORMATIONS IN POROUS MEDIA.
California Univ., Berkeley. Div. of Applied Mechanics.
For primary bibliographic entry see Field 20K.
AD-646 910 HC$3.00 MF$0.65

INVESTIGATION OF HEAT TRANSFER AT HIGH HEAT FLUX: EXPERIMENTAL STUDY OF HEAT TRANSFER AND FRICTION DROP WITH n-BUTYL ALCOHOL IN AN ELECTRICALLY HEATED TUBE.
Jet Propulsion Lab., Pasadena, Calif.
For primary bibliographic entry see Field 20M.
N63-83586 HC$3.00 MF$0.65

IMPROVED FLUID DYNAMICS SIMILARITY, ANALYSIS AND VERIFICATION ANNUAL REPORT, 29 JUN. 1965 - 28 JUN. 1966.
Purdue Univ., Lafayette, Ind. Heat Transfer Lab.
R. Griebe, W. J. Leech, T. Libby, M. A. Ramayya, and R. J. Schoenhals. 25 Aug 66, 180p NASA-CR-81181, AR-1
Contract NAS8-20222

Descriptors: *Fluid mechanics, *Liquid flow, *Single-phase flow, *Two-phase flow, Analysis, Discharge, Dynamics, Energy, Flow, Fluid, Graph, Heat transfer, Liquid, Mechanics, Phase, Similarity, Single, Transport, Two, Verification.

For abstract, see STAR 05 06.
N67-15523 HC$3.00 MF$0.65

COMPARISON OF EXPERIMENTAL DATA AND SEMIEMPIRICAL CALCULATIONS FOR AN IMCOMPRESSIBLE TURBULENT BOUNDARY LAYER WITH A PRESSURE GRADIENT.
Sopostavleniye Dannykh Eksperimenta I Poluem-Piricheskogo Rascheta Dlya Nezhimayemogo Tur- Bulentnogo Pogranichnogo Sloya S Gradiyentom Davleniya
National Aeronautics and Space Administration, Washington, D. C.
A. V. Kolesnikov. Dec 66, 11p NASA-TT-F-10434
Transl. Into English From Inzh.-fiz. Zh. (Ussr), V. 10, No. 4, 1966 P 465-471

Descriptors: *Incompressible flow, *Pressure gradient, *Turbulent boundary layer, Approximation, Boundary, Calculation, Distribution, Drag, Flow, Gradient, Incompressible, Layer, Mixing, Pressure, Profile, Reynolds number, Shear, Stress, Turbulent, Velocity.

For abstract, see STAR 05 06.
N67-15552 HC$3.00 MF$0.65

EXPERIMENTAL FLOW FIELD AND HEAT-TRANSFER INVESTIGATION OF SEVERAL TENSION SHELL CONFIGURATIONS AT A MACH NUMBER OF 8.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
D. M. Bushnell, J. L. Hunt, and R. A. Jones. Jan 67, 60p NASA-TN-D-3800
Contract 124-07-02-60-23

Descriptors: *Conical shell, *Flow field, *Heat transfer, *Hypersonic speed, *Pressure distribution, Aerodynamics, Angle, Attack, Boundary, Conical, Distribution, Effect, Entry, Field, Flow, Heat, Hypersonic, Layer, Mars, Pressure, Reynolds number, Separation, Shell, Speed, Temperature, Tension, Test, Transfer, Tunnel, Unmanned, Wall, Wind.

For abstract, see STAR 05 06.
N67-15665 HC$3.00 MF$0.65

CALCULATION OF A JET AXIS IN A DRIFTING FLOW.
Raschet Osi Strui V Snosyaschem Potoke
National Aeronautics and Space Administration, Washington, D. C.
G. S. Shandorov. Dec 66, 7p NASA-TT-F-1063
Transl. Into English From Izv. Vyssh. Ucheb. Zaved., Ser. Aviats. Tekh. (Kazan), V. 9, No. 2, 1966 P 100-104

Descriptors: *Flow deflection, *Gas flow, *Jet flow, *Subsonic flow, Axis, Calculation, Circular, Cross section, Deflection, Drift, Flow, Force, Gas, Jet, Single, Solution, Subsonic, Unbounded, Uniform.

For abstract, see STAR 05 06.
N67-15698 HC$3.00 MF$0.65

OPTIMUM FORMS OF BODIES WITH ASSOCIATED SHOCK WAVES.
Optimal'nyye Formy Tel S Prisoyedinennymi Udarnymi Volnami
National Aeronautics and Space Administration, Washington, D. C.
A. V. Shipilin. Jan 67, 16p NASA-TT-F-10672
Transl. Into English From Mekhan. Zhidkosti I Gaza (Moscow), No. 4, 1966 P 9-18

Descriptors: Axisymmetric body, Axisymmetry, Body, Dimensional, Flow, Form, Gas, Ideal, Optimization, Shock, Shock wave, Supersonic, Supersonic flow, Two, Two-dimensional body, Wave.

For abstract, see STAR 05 06.
N67-15765 HC$3.00 MF$0.65

STUDY OF PRESSURE LOSSES IN TUBING AND FITTINGS QUARTERLY PROGRESS REPORT, DEC. 1965 - FEB. 1966.
Mississippi State Univ., State College. Dept. of Mechanical Engineering.
C. W. Bouchillon, C. T. Carley, J. E. Corley, and J. Mc Dermit. Feb 66, 27p NASA-CR-81236, QPR-7
Contract NAS8-11297

Descriptors: *Fitting, *Flow characteristics, *Pressure drop, *Tubing, Analysis, Characteristics, Computer, Drop, Effect, Entrance, Flexible, Flow, Fluid, Hose, Loss, Mechanics, Metal, Prediction, Pressure, Program, Roughness, Surface.

For abstract, see STAR 05 06.
N67-15844 HC$3.00 MF$0.65

A THERMODYNAMIC FLOW ANALYSIS OF PARTICLE FORMATION EFFICIENCY IN A MIXED FLOW COLLOID THRUSTOR.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 20M.
For abstract, see STAR 05 06.
N67-16045 HC$3.00 MF$0.65

SECONDARY FLOW RATES IN A VERTICAL DIFFUSER OF DECREASING LENGTH USING A ROCKET EXHAUST JET AS THE MOTIVE FLUID.

National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
For primary bibliographic entry see Field 21H.
For abstract, see STAR 05 06.
N67-16050 HC$3.00 MF$0.65

EXPERIMENTAL STUDY OF EQUILIBRIUM AIR TOTAL RADIATION.
General Electric Co., Philadelphia, Pa.
For primary bibliographic entry see Field 20M.
For abstract, see STAR 05 06.
N67-16513 HC$3.00 MF$0.65

EFFECT OF REYNOLDS NUMBER ON SLOSH DAMPING BY FLAT RING BAFFLES.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
H. Buchanan, and L. Lott. 22 Dec 66, 22p
NASA-TM-X-53559

Descriptors: *Baffle, *Damping, *Reynolds number effect, *Sloshing, Attitude, Coefficient, Control, Drag, Effect, Flat, Fluid, Gravity, Mechanics, Propellant, Reynolds number, Ring, Space vehicle.

For abstract, see STAR 05 06.
N67-16542 HC$3.00 MF$0.65

KINETIC THEORY OF BIMOLECULAR CHEMICAL REACTION, DIFFUSIVE DRAG, AND OTHER PROCESSES IN A GAS MIXTURE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 7D.
For abstract, see STAR 05 06.
N67-16553 HC$3.00 MF$0.65

CAVITATION DAMAGE IN LIQUID METALS (POTASSIUM STUDIES) TECHNICAL PROGRESS REPORT, 1 AUG. - 31 OCT. 1966.
Hydronautics, Inc., Laurel, Md.
For primary bibliographic entry see Field 11F.
For abstract, see STAR 05 06.
N67-16606 HC$3.00 MF$0.65

STUDY OF THE PRESSURE DISTRIBUTION ON OSCILLATING PANELS IN LOW SUPERSONIC FLOW WITH TURBULENT BOUNDARY LAYER.
Georgia Inst. of Tech., Atlanta.
E. F. Zeydel. Feb 67, 58p NASA-CR-691
Contract NAS2-2897

Descriptors: *Panel flutter, *Pressure distribution, *Supersonic flow, *Turbulent boundary layer, Aerodynamic, Boundary, Chordwise, Dimensional, Direction, Distribution, Flow, Flutter, Force, Fourier analysis, Layer, Model, Oscillation, Panel, Perturbation, Pressure, Supersonic, Thickness, Turbulent, Two, Wall.

For abstract, see STAR 05 06.
N67-16669 HC$3.00 MF$0.65

FLUTTER ANALYSIS OF FLAT RECTANGULAR PANELS BASED ON THREE-DIMENSIONAL SUPERSONIC UNSTEADY POTENTIAL FLOW.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
H. J. Cunningham. Feb 67, 52p NASA-TR-R-256
Contract 126-14-02-01-23

Descriptors: *Panel flutter, *Potential flow, *Supersonic flutter, *Three-dimensional flow, *Unsteady flow, Aerodynamic, Aluminum, Beam, Box, Coupling, Dimensional, Flat, Flow, Flutter, Force, Frequency, Isotropy, Method, Mode, Panel, Potential, Shape, Stability, Stiffness, Supersonic, Test, Three, Unsteady, Vibration.

For abstract, see STAR 05 06.
N67-16675 HC$3.00 MF$0.65

WIND-TUNNEL INVESTIGATION OF THE FLIGHT CHARACTERISTICS OF A MODEL OF AN ASPECT- RATIO-6 CONICAL-PARAWING UTILITY VEHICLE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 05 06.
N67-16684 HC$3.00 MF$0.65

THE AERODYNAMIC CHARACTERISTICS OF A SLENDER BODY TRAVELING IN A TUBE.
Technical rept.,
Oceanics, Inc., Plainview, N. Y.
Theodore R. Goodman. Jan 67, 50p TR-66-31
Contract C-265-66

Descriptors: (*Slender bodies, *Aerodynamic characteristics), Pipes, Bodies of revolution, Stability, Pressure, Distribution.

Slender-body theory is applied to determine the flow about a slender body of revolution traveling in a tube. A formula for the pressure distribution on an ellipsoid centered in the tube is derived and it is shown that for a body whose diameter is a large percent of the tube diameter the pressures are an order of magnitude greater than they would be for the same body traveling in free air. It follows that a body which passes from a wide to a narrow passage will experience a large impact loading. Formulas for all the static and dynamic stability derivatives are then derived for an arbitrary body of revolution in terms of its cross-sectional area distribution. These formulas are specialized to an ellipsoid of revolution as an illustrative example, and plots of the results are presented as a function of the ratio of the maximum cross-sectional area of the body to the area of the tube. For the body whose diameter is a large percent of the tube diameter the stability derivatives also become an order of magnitude greater than they would be for the same body in free air. (Author)
PB-173 997 HC$3.00 MF$0.65

PROJECT TUBEFLIGHT. PHASE I. FEASIBILITY STUDY.
Rensselaer Polytechnic Inst., Troy, N. Y.
For primary bibliographic entry see Field 13F.
PB-174 085 HC$3.00 MF$0.65

20E. MASERS AND LASERS

A PROPOSED TWISTED-MODE TECHNIQUE FOR OBTAINING SINGLE-AXIAL-MODE OSCILLATION IN A RUBY LASER.
Stanford Univ., Calif. Stanford Electronics Labs.
A. E. Siegman. Sep 64, 31p SU-SEL-64-109, TR-0592-1
Contract DA-36-039-sc-90839

Descriptors: (*Lasers, Oscillation), Ruby, Analysis, Mirrors, Standing wave ratios, Refraction, Polarization, Wave transmission, Instrumentation, Design.
Identifiers: Single-axial-mode, Twisted-mode.

A proposed technique for obtaining oscillation in a single axial mode in a ruby laser is described and analyzed. The technique involves the use of a quarter-wave plate inside each laser mirror, together with a 0 degree ruby rod. The principal axes of the quarter-wave plates are rotated by 45 degrees with respect to each other. The axial modes in this system have the form of twisted ribbons, with axially uniform transverse E field density. It is believed that this will lead to axially uniform ruby saturation, and hence oscillation in a single axial mode. The general case of arbitrary wave plates at arbitrary angles has also been analysed, and the resulting mode forms and mode spectra are presented. (Author)
AD-452 584 HC$3.00

STIMULATED BRILLOUIN AND RAMAN SCATTERING IN QUARTZ AT 2.1 TO 293 KELVIN.
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
For primary bibliographic entry see Field 20B.
AD-646 489 Not available from CFSTI.

SELECTIVE ACCESS LASER DISPLAY BEAM POSITIONER.
Quarterly rept. no. 2, 1 Jun-31 Aug 66,
Hughes Research Labs., Malibu, Calif.
J. F. Lotspeich, W. P. Brown, Jr., and J. E. Kiefer. Jan 67, 64p
RADC-TR-66-617
Contract AF 30 (602)-4097
See also AD-639 968.

Descriptors: (*Lasers, Viewing screens), (*Display systems, Lasers), Deflection, Images, Electrooptics, Beams (Electromagnetic), Prisms (Optics).

The investigation concerns the development of a selective access laser display beam positioner capable of presenting a flexible format and multicolor images on large screen map backgrounds. Basic requirements of the beam positioner are microsecond response and random deflection to any of approximately 1,000,000 resolvable spots. The results of a continuing experimental and theoretical effort toward achieving these objectives are presented. The approach is concentrated on studying the performance characteristics of an iterated electro-optic prism beam angle deflector and on establishing the limits of its resolution capability. It is believed that this type of deflector, augmented by one or two stages of binary-switched lateral beam positioner, will provide maximum optical transmission with minimum driving power. (Author)
AD-646 619 HC$3.00 MF$0.65

FOREIGN SCIENCE BULLETIN VOL. 3, NO. 1, 1967.
Library of Congress, Washington, D. C. Aerospace Technology Div.
For primary bibliographic entry see Field 5A.
AD-646 634 HC$3.00 MF$0.65

EFFECTS OF POWER DENSITY ON CHARACTERISTICS OF LASER BEAM INTERACTION WITH SOLID MATERIALS.
Memorandum rept.,
Ballistic Research Labs., Aberdeen Proving Ground, Md.
William F. Braerman, and Charles R. Stumpfel. Sep 66, 47p BRL-MR-1791

Descriptors: (*Lasers, Power), (*Coherent radiation, Interactions), (*Aluminum, Lasers), (*Tungsten, Lasers), (*Copper, Lasers), (*Pyrolytic graphite, Lasers), Vaporization, Plasma medium, Penetration, Spectroscopy, Line spectrum, Atomic energy levels.

The power density of a 2.8 msec pulse length laser was varied from approximately 100,000 to 10,000,000 watts per square centimeter in order to observe various laser beam solid interaction characteristics. Mass loss, penetration depth, and time integrated and some time-resolved spectroscopic results are reported for tungsten, pyrolytic graphite, aluminum and copper. (Author)
AD-646 732 HC$3.00 MF$0.65

NOISE CONSIDERATION FOR THE DETECTION OF WEAK LASER SIGNALS.

Interim rept. 1 Mar-1 Jun 66,
RCA Victor Co., Ltd., Montreal (Quebec). Research Labs.
A. L. Waksberg, and I. P. Shkarofsky. Sep 66, 60p
RR-7-801-49
ARL-66-0181
Contract AF 33 (615)-2196

Descriptors: (*Lasers, Signal-to-noise ratio), Light pulses, Detection, Noise, Blackbody radiation, Coherent radiation, Modulation, Phase-locked systems, Pulse amplifiers, Bremsstrahlung, Thermal radiation, Scattering, Gas ionization, Plasma medium, Recombination reactions, Emissivity, Probes.
Identifiers: Plasma diagnostics.

A study is made of the minimum laser signal that can be detected when it is embedded in a background of black body radiation and other sources of noise. In particular, the laser source is assumed to be modulated and a phase lock or pulse coincidence amplifier to be employed. General ex ressions are derived for the signal-to-noise ratio at the output of a phase lock (or pulse amplifier) for a signal immersed in noise. The types of modulation that are examined comprise sinusoidal, square wave and pulse modulation. The noise considered is that arising from black body and Bremsstrahlung radiation, thermal noise, generation, recombination noise etc.. In particular, laser noise is discussed in some detail. Finally, a Thomson scattering experiment is considered as a special case. (Author)
AD-646 744 HC$3.00 MF$0.65

RAMAN LASERS USING SECONDARY RAMAN LINES.
Revised ed.,
California Univ., Berkeley. Dept. of Electrical Engineering.
S. E. Schwarz, and A. Pine. 6 Jun 66, 5p
AFOSR-67-0341
Grants AF-AFOSR-139-65, AF-AFOSR-139-66
Prepared in cooperation with Gordon McKay Lab. of Applied Science, Harvard Univ., Cambridge, Mass. Revision of manuscript received 14 Apr 66.
Availability: Published in Applied Physics Letters n1 p49-51 Jul 1 1966.

Descriptors: (*Lasers, Raman spectroscopy), Reflectivity, Organic compounds, Ruby, Feedback, Molecules, Resonators, Mirrors, Decay schemes, Brillouin zones, Geometry.

A method of obtaining Raman Lasers action on secondary and weak vibrational Raman lines is described. The method can be used to increase the number of wave lengths at which high intensity coherent radiation is available. (Author)
AD-646 832 Not available from CFSTI.

ELECTRO-OPTIC DEFLECTION WITH BaTiO3 PRISMS,
California Univ., Berkeley. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 20F.
AD-646 837 Not available from CFSTI.

RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Columbia Radiation Lab., New York.
For primary bibliographic entry see Field 9C.
AD-646 898 HC$3.00 MF$0.65

A PARAMETER STUDY OF A CARBON DIOXIDE GAS LASER.
Ohio State Univ. Research Foundation, Columbus. Dept. of Electrical Engineering.
D. B. Rensch. 15 Nov 66, 57p NASA-CR-81332, REPT.-1093-34
Grant NSG-74-60

Descriptors: *Carbon dioxide, *Discharge tube, *Flow velocity, *Gas laser, *Wall temperature, Action, Calculation, Discharge, Flow, Gas, Laser, Length, Mixture, Parameter, Rate, Temperature, Theory, Tube, Velocity, Wall, Width.

For abstract, see STAR 05 06.
N67-16633 HC$3.00 MF$0.65

IONISATION D'UN ATOME DE CESIUM PAR UN PROCESSUS D'ABSORPTION A DEUX PHOTONS ISSUS D'UN FAISEAU LASER (Ionisation of a Cesium Atom by an Absorption Process Involving two Photons from a Laser Beam),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 20H.
PB-174 043 HC$3.00 MF$0.65

20F. OPTICS

PHOTOCONDUCTIVITY AND NOISE IN TELLURIUM,
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
For primary bibliographic entry see Field 20L.
AD-417 657 HC$3.00

RAYS AND RAY-ENVELOPES WITHIN STABLE OPTICAL RESONATORS CONTAINING FOCUSING MEDIA.
Research rept.,
Polytechnic Inst. of Brooklyn, N. Y. Microwave Research Inst.
Noritaka Kurauchi, and Walter K. Kahn. Jan 66, 35p PIBMRI-1313-66
Contract AF 49 (638)-1402

Descriptors: (*Resonators, Optical equipment components), Optics, Interferometers, Waveguides, Mirrors, Optical properties, Light transmission.

In stable resonators any given initially paraxial rays remain close to the axis of the structure and are, in fact, confined within well-defined contours, the envelope of the ray system. Previously, envelopes of rays in empty resonators had been found and their form identified with the variation of the spot size. This geometric optical approach is extended to general resonators, comprising arbitrary arrangements of lenses and convergent or divergent inhomogeneous focusing media. An invariant quadratic form involving parameters descriptive of any of the ray-segments which result from a given initial ray-segment leads to a differential equation satisfied by the ray-segments and their envelope in portions of the resonator. A maximum-minimum problem for the envelope is formulated and solved. In convergent media the envelope function is found to be periodically modulated. The period of the modulation depends only on the properties of the convergent medium; the location of relative maxima and minima as well as their ratio depends on both the medium and associated optics. In special cases, results are compared with available solutions of the corresponding electromagnetic problem. A particularly simple resonator is analyzed, and envelope characteristics correlated with the stability limits. (Author)
AD-646 354 HC$3.00 MF$0.65

THE TRANSFORMATION OF A BEAM DURING INTERACTION OF LIGHT WITH A SUBSTANCE,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
F. I. Fedorov. 5 Dec 66, 13p FTD-HT-66-651
TT-67-60771
O Preobrazovanii Puchka pri Vzaimodestvii Sveta s Veshchestvom, unedited rough draft trans. of Zhurnal Prikladnoi Spektroskopii (USSR), v4 n1 p58-63 1966.

Descriptors: (*Rayleigh scattering, *Light), Luminescence, Tensor analysis, Polarization, Refraction, Reflection, Integrals, Refractive index, Light transmission, Crystals, USSR.

The transformation of the tensor of a light beam during Rayleigh scattering and the elementary volume of a luminescent substance, a luminescent crystal and during Fresnal reflection and refraction of light is considered. It is shown that the proposed covariant method is considerably more rapid and leads to the required results more simply than when Stokes parameters are used. (Author)
AD-646 376 HC$3.00 MF$0.65

IR DETECTOR TEMPERATURE REGULATOR FOR CO VIBRALUMINESCENCE STUDIES.
Interim rept.,
Utah State Univ., Logan. Electro-Dynamics Labs.
Marshall D. Ketchum, and Doran J. Baker. 25 May 66, 57p Scientific-4
AFCRL-66-587
Contract AF 19 (628)-251

Descriptors: (*Carbon monoxide, *Luminescence), (*Infrared detectors, *Temperature control), Photoelectric cells (Semiconductor), Cooling, Nitrogen, Heat exchangers, Molecular energy levels, Excitation, Photochemistry, Reaction kinetics, Infrared radiation, Emissivity.

A temperature regulator for lead sulfide infrared detectors was designed and built. The detector itself was used as the temperature sensing device in the control system. Cold nitrogen gas was used to cool the detector to a temperature below the operating point. A heat exchanger, mounted between the cold source and the detector, warmed the detector to its operating temperature. This regulator and detector were used to study the energy transfer process which takes place between vibrationally excited nitrogen and carbon monoxide at low pressures. The rate constant for the transfer process was determined for the carbon monoxide overtone region between 2.3 and 2.5 microns. (Author)
AD-646 429 HC$3.00 MF$0.65

LIGHT SCATTERING BY LIQUIDS AND MOLECULAR SOLIDS.
Doctoral thesis,
California Univ., Santa Barbara. Dept. of Physics.
Stanley Leland Shapiro. 1 Feb 67, 67p TR-21
Contract Nonr-4222 (01), ARPA Order-125

Descriptors: (*Light, Scattering), (*Liquids, Light transmission), (*Solids, Light transmission), Carbon compounds, Sulfides, Carbon tetrachloride, Spectra (Visible + ultraviolet), Molecular rotation, Raman spectroscopy, Oxygen, Nitrogen, Carbon monoxide, Liquefied gases, Solidified gases, Sound transmission.

Measurements of the frequency broadening caused by molecular rotations were made in liquid carbon disulfide and in liquid mixtures of carbon disulfide and carbon tetrachloride by observing scattered light from an Ar (+) laser at 4880A. The spectral shape of the scattered light was found to be nearly Lorentzian. Half-widths of the scattered radiation in carbon disulfide range from about 0.1/cm near the triple-point to 6/cm near the boiling point. Addition of carbon tetrachloride to carbon disulfide at room temperature causes the half-widths to decrease. Measurements of the frequency broadening were used to calculate relaxation times for the attenuation of molecular rotations in liquids. Vibrational Raman scattering was excited in liquid and solid carbon monoxide and nitrogen, and orientation scattering was studied in liquid oxygen. Brillouin scattering measurements were made in room temperature liquids in which an Ar (+) laser has been used as a source of excita-

tion. A He3-Ne laser was used to excite Brillouin scattering in liquid NH3 and ND3. Measurements of the Brillouin shifts were used to calculate the velocity of sound of the phonons in the gigacycle frequency range. Velocity dispersions at about 2Gc in liquid NH3 and ND3 have been postulated to be due to a structural relaxation of the liquids.
AD-646 515 HC$3.00 MF$0.65

GENERATION OF TWO-DIMENSIONAL OPTICAL SPATIAL AUTO- AND CROSS-CORRELATION FUNCTIONS,
Navy Underwater Sound Lab., New London, Conn.
For primary bibliographic entry see Field 9D.
AD-646 554 HC$3.00 MF$0.65

SUMMARY OF THE CONFERENCE ON THE OPTICAL PROPERTIES OF AEROSOLS, 15-17 OCTOBER 1964, ONCHIOTA CONFERENCE CENTER, STERLING FOREST, TUXEDO, NEW YORK,
New York Univ., N. Y. Geophysical Sciences Lab.
For primary bibliographic entry see Field 4A.
AD-646 612 HC$3.00 MF$0.65

SELECTIVE ACCESS LASER DISPLAY BEAM POSITIONER.
Hughes Research Labs., Malibu, Calif.
For primary bibliographic entry see Field 20E.
AD-646 619 HC$3.00 MF$0.65

SOME PROPERTIES OF ATTENUATION IN THE ATMOSPHERE.
American Meteorological Society, Boston, Mass.
For primary bibliographic entry see Field 4A.
AD-646 679 HC$3.00 MF$0.65

ABSORPTION SPECTRA OF MnF2, KMnF3, RbMnF3, AND CsMnF3,
McGill Univ., Montreal (Quebec). Eaton Electronics Research Lab.
Richard Stevenson. 13 Jan 65, 14p
Research supported in part by NRC and ONR.
Availability: Published in Canadian Journal of Physics v43 p1732-43 Oct 1965.

Descriptors: (*Fluorides, Spectra (Visible + ultraviolet)), (*Manganese compounds, Spectra (Visible + ultraviolet)), Antiferromagnetism, Temperature sensitive elements, Phase studies, Absorption spectrum, Spin, Cryostats.
Identifiers: Manganese fluoride, Potassium manganese fluoride, Rubidium manganese fluoride, Cesium manganese fluoride.

Absorption spectra in the 3 000-4 000 A region are presented for MnF2, KMnF3, RbMnF3, and CsMnF3 at room temperature, liquid-air temperature, and liquid-helium temperature. The spectra are similar at room temperature, but at low temperatures some differences appear. The 4.2 K spectra of KMnF3 and CsMnF3 show evidence of splittings due to exchange-coupled ion pairs, and an estimate is made of the exchange-coupling constant for the excited states. The spectrum of KMnF3 shows two lines associated with a 4T3 level, which may be satellites caused by the magnetic phase transition. The spectra were examined in external magnetic fields up to 100 000 Oe, and no splitting or shiftings of the lines were observed. Crystal field parameters were calculated by fitting the room-temperature spectra. (Author)
AD-646 821 Not available from CFSTI.

DEFLECTION-MODULATION CRT DISPLAY,
California Univ., Berkeley. Dept. of Electrical Engineering.
Thomas E. Everhart. 8 Jul 66, 5p
AFOSR-67-0342
Contract AF 33 (615)-2306, Grant AF-AFOSR-139-64
Availability: Published in Proceedings of the IEEE v54 n10 p1480-2 Oct 1966.

Descriptors: (*Stereoscopic display systems, Cathode ray tubes), Deflection, Modulation, Electron microscopy, Scanning.

A cathode-ray-tube display is reported which combines the two-dimensional aspects of a normal television display with the quantitative aspects of a cathode-ray oscillograph. Both advantages and limitations of this 'deflection-modulation display,' which has a striking three-dimensional appearance, are discussed. The illustrative examples shown here resulted from scanning a transistor with a small-diameter electron beam, and using the induced current as a video signal. Additional applications are suggested. (Author)
AD-646 833 Not available from CFSTI.

ELECTRO-OPTIC DEFLECTION WITH BaTiO3 PRISMS,
California Univ., Berkeley. Dept. of Electrical Engineering.
E. P. Ippen. 9 Mar 66, 3p
AFOSR-67-0345
Grants AF-AFOSR-139-64, AF-AFOSR-139-65
Availability: Published in IEEE Journal of Quantum Electronics vQE2 n6 p152 Jun 1966.

Descriptors: (*Electrooptics, Deflection), (*Barium compounds, Titanates), (*Lasers, Deflection), Prisms, Optics, Single crystals.

Polished prisms of single crystal BaTiO3 with aluminum electrodes on the opposite plane parallel faces were used to demonstrate deflection of a 6328 A laser beam by the quadratic electron optic effect. Deflection was slow speed but resolutions of more than 6 spots were obtained with a single prism. Two electro-optic coefficients, g11 and g12, were measured at temperatures above the Curie point. (Author)
AD-646 837 Not available from CFSTI.

CONTINUOUS FACSIMILE SCANNER EMPLOYING FIBER OPTICS.
IIT Research Inst., Chicago, Ill. Technology Center.
For primary bibliographic entry see Field 17B.
AD-646 856 HC$3.00 MF$0.65

RESEARCH DIRECTED TOWARD THE STUDY OF INFRARED TRANSMISSION THROUGH VARIOUS ATMOSPHERES.
Final rept., 19 Dec 63-31 Aug 66,
North Carolina State Univ., Raleigh. Physical Science Research.
Charles N. Harward, Edward R. Manring, and Richard R. Patty. Dec 66, 37p
AFCRL-67-0007
Contract AF 19 (628)-3898

Descriptors: (*Infrared radiation, Wave transmission), (*Ammonia, Infrared phenomena), Absorption spectrum, Spectra (Infrared), Helium, Interactions, Spectrometers, Band spectrum, Carbon dioxide.

Previously reported work is summarized (see AD-607 401 and AD-638 747), and a detailed report is given concerning further data obtained for ammonia samples at reduced temperatures are presented and used to obtain a self-broadening coefficient relative to helium. Some data in report AD-638 747 indicate a possible temperature dependence of the optical collision diameters; further data is necessary to determine the functional dependence. It appears that the dependence is T exp.-b where b is a small positive number. A prism spectrometer was used with a sampling technique involving a continuous gas flow through the absorption cell to obtain a band strength for the 667/cm band of CO2 which is in agreement with that obtained from high resolution measurements and agrees with the spectral characteristics given by Burch, Gryvnak, and Williams. (Author)
AD-646 884 HC$3.00 MF$0.65

RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Columbia Radiation Lab., New York.
For primary bibliographic entry see Field 9C.
AD-646 898 HC$3.00 MF$0.65

DETECTOR INVESTIGATION FOR 8-15 AND 100-4000 MICRON REGIONS.
Naval Research Lab., Washington, D. C.
For primary bibliographic entry see Field 17E.
AD-646 927 HC$3.00 MF$0.65

SCANNING ELECTRON PROBE MICROANALYSIS.
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 7D.
NBS-TN-278 HC$0.30 MF$0.65

EVALUATION OF THE CONSTANT MOMENTUM MASS SPECTROMETER FOR IONOSPHERIC INVESTIGATIONS.
Pennsylvania State Univ., University Park. Dept. of Electrical Engineering.
H. M. Luther. 1 Nov 66, 37p NASA-CR-81186, SR-283
Contract NGR-39-009-32

Descriptors: *Ionospheric sounding, *Mass spectrometer, Analysis, Composition, Constant, Energy, High pressure, Ion, Ionospheric, Mass, Momentum, Pulse, Sounding, Spectrometer, Spectrum.

For abstract, see STAR 05 06.
N67-15457 HC$3.00 MF$0.65

OPTICAL INSTABILITY OF THE EARTH'S ATMOSPHERE.
Israel Program for Scientific Translations, Ltd., Jerusalem.
For primary bibliographic entry see Field 4B.
For abstract, see STAR 05 06.
N67-15461 HC$3.00 MF$0.65

AN INTEGRATING SPHERE COATING FOR THE VACUUM ULTRAVIOLET SPECTRAL REGION.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
J. B. Heaney. Dec 66, 16p NASA-TM-X-55645, X-713-66-571

Descriptors: *Reflectometer, *Sodium salicylate, *Ultraviolet spectrum, *Vacuum ultraviolet, Coating, Fluorescence, Magnesium, Oxide, Radiation, Reflection, Salicylate, Sodium, Spectrum, Ultraviolet, Vacuum.

For abstract, see STAR 05 06.
N67-16547 HC$3.00 MF$0.65

THE EFFECT OF NON-LINEARITIES ON OPTICAL CORRELATION PROCESSING.
North Carolina State Coll., Raleigh.
J. P. Moffatt, and F. J. Tischer. Nov 66, 19p
NASA-CR-81335, EML-2
Contract NGR-34-002-038

Descriptors: *Correlation function, *Nonlinearity, *Optical filter, *Series expansion, Coherent, Correlation, Device, Distortion, Effect, Expansion, Filter, Function, Internal, Light, Optical, Output, Series, Transmission.

For abstract, see STAR 05 06.
N67-16630 HC$3.00 MF$0.65

CINEMATOGRAPHIE DE PHENOMENES TRANSITOIRES FAIBLEMENT LUMINEUX A L'AIDE D'AMPLIFICATEURS DE LUMINANCE (Cinematography of Weakly-Luminous Transient Phenomena Using Image Converters),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 14B.
PB-174 046 HC$3.00 MF$0.65

20G. PARTICLE ACCELERATORS

ON THE CRITICAL EFFECT OF GEOMETRIC DIMENSIONS OF EXTRACTION SYSTEMS OF A HIGH FREQUENCY PROTON SOURCE ON THE CURRENT INTENSITY OF AN ION BEAM,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
M. D. Gabovich, and G. N. Pyankov. 23 Apr 64, 6p FTD-TT-64-331
TT-67-60882
Unedited rough draft trans. of Ukrayinski Fizychnyi Zhurnal (USSR), v3 n3 p419-20 1958.

Descriptors: (*Proton accelerators, *Ionic current), High frequency, Magnetic properties, Circuits, Ion sources, Electric currents, Plasma generators, USSR.

The paper contains a system of exciting a discharge in a high frequency proton source, which allows at constant power to rise the intensity of the ion stream near the outlet channel, and also the magnitude of the current of the ion beam by several times. The system differs from the ordinary one by the fact, that the resistance 'transverse' magnetic field is rectified along the axis of ion extraction, and the axis of the high frequency circuit coil-perpendicular to that axis. Certain investigations to explain the effect of the geometry of the system of extracting on the current intensity of the ion beam are included. (Author)
AD-440 937 HC$3.00

ALTERNATE-GRADIENT FOCUSING OF MOLECULAR BEAMS.
Interim rept.,
Chicago Univ., Ill. Inst. for the Study of Metals.
Daniel Auerbach, Edward E. A. Bromberg, and Lennard Wharton. 18 May 66, 9p
AFOSR-67-0024
Grant AF-AFOSR-866-65
Availability: Published in Journal of Chemical Physics v45 n6 p2160-6 Sep 15 1966.

Descriptors: (*Molecular beams, Focusing), (*Electromagnetic lenses, Molecular beams), Electrostatics, Theorems, Dipole moments, Electromagnetic fields, Wire, Polarization, Spectroscopy, Relaxation oscillators, Particle trajectories, Particle accelerators.

Space focusing of molecular beams is an established technique achieved by multipole fields for molecules in states that gain energy with applied field. Very often, however, one wants to focus molecules in states that lose energy with applied field. This latter problem is discussed here, and it is shown that the technique called 'strong' or 'alternate-gradient,' AG, focusing is of quite general applicability. The dipole, 'two-wire' field is shown to be the neutral beam analog of magnetic or electric quadrupole used for AG focusing of charged beams. Exploitation of circular motion or large energy change to achieve focusing is discussed, although these methods do not seem to be as widely applicable as AG focusing. Some specific field configurations and applications are considered: (1) focusing in a molecular-beam accelerator, (2) 'flop-in' state selection for positive polarizability or effective moment, (3) beam storage, (4) novel spectroscopy for measuring dipole moments and polarizabilities to high accuracy, that has further applications for high-purity state selection, (5) velocity selection. (Author)
AD-646 406 Not available from CFSTI.

ONE-DIMENSIONAL ANALYSIS OF A TRAVELLING WAVE ACCELERATOR.
Innsbruck Univ. (Austria). Inst. for Theoretical Physics.
H. Friedel. 20 Dec 66, 14p Scientific-41
AFOSR-67-0383
Contract AF 61 (052)-675

Descriptors: (*Traveling-wave electron accelerators, *Magnetohydrodynamics), Numerical analysis, Theory, One-dimensional flow, Plasma medium, Interactions, Magnetic fields.

The one-dimensional unsteady interaction of a plasma with a magnetic wave field in a travelling wave accelerator is investigated numerically by solving the MGD basic equations in (B<<1)-approximation. Finally a one-dimensional analytical model for such a travelling wave acceleration is given being in good accordance with the numerical results. (Author)
AD-646 778 HC$3.00 MF$0.65

NONFERROUS ACCELERATOR OF CHARGED PARTICLES,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
E. A. Abramyan, G. I. Budker, and A. A. Naumov.5 Dec 66, 6p FTD-HT-66-603
Bezzheleznyi Uskoritel Zaryazhennykh Chastits, unedited rough draft trans. of Patent (USSR) 168 808, appl. 829694/26-25, 8 Apr 63.

Descriptors: (*Particle accelerators, Design), Charged particles, Particle beams, Magnetic fields, Resonators, Injectors, USSR, Patents.

A nonferrous charged-particle accelerator that contains a vacuum chamber, resonator, injector, and current-conducting buses is described. It is distinguished by the fact that an equalizing central bus is used to accelerate particles of the same sign in opposite directions. The accelerator is designed in the form of a nonsymmetrical 'racetrack' to assure the intersection of particle beams. (Author)
AD-646 930 HC$3.00 MF$0.65

RF PERTURBATION MEASUREMENTS IN LONG LINAC CAVITIES, FROM LINEAR ACCELERATOR CONFERENCE, LOS ALAMOS, N. MEX,
Midwestern Universities Research Association, Stoughton, Wis.
C. W. Owen, C. A. Radmer, and D. E. Young. 3 Oct 66, 22p
Conf-661021-24
Contract W-31-109-eng-38
Prepared for presentation at the Linear Accelerator Conference, Los Alamos, N. Mex.

Descriptors: (*Linear accelerators, Perturbation theory), (*Perturbation theory, Synchrotrons), Electric fields, Digital computers.

For abstract, see NSA 21 04.
MURA-723 HC$3.00 MF$0.65

20H. PARTICLE PHYSICS

MAGNETIC FIELD DEPENDENCE OF THE KNIGHT SHIFT.
Battelle Memorial Inst., Columbus, Ohio. Columbus Labs.
For primary bibliographic entry see Field 20L.
AD-646 396 Not available from CFSTI.

CURRENT-COMMUTATOR CALCULATION OF THE K14 FORM FACTORS.
California Univ., Berkeley. Dept. of Physics.
For primary bibliographic entry see Field 20J.
AD-646 410 Not available from CFSTI.

COLLECTIVE NUCLEAR 'BREATHING MODE' MODEL WITH APPLICATION TO 4He MONOPOLE STATE.
Catholic Univ. of America, Washington, D. C. Dept. of Physics.
For primary bibliographic entry see Field 20J.
AD-646 434 Not available from CFSTI.

TIME DEPENDENT NEUTRON TRANSPORT FROM A POINT ISOTROPIC SOURCE AT AN ALTITUDE OF (9.144 KM) 30,000 FT,
Braddock, Dunn, and McDonald, Inc., El Paso, Tex.
For primary bibliographic entry see Field 18H.
AD-646 458 HC$3.00 MF$0.65

LIGHT SCATTERING BY LIQUIDS AND MOLECULAR SOLIDS.
California Univ., Santa Barbara. Dept. of Physics.
For primary bibliographic entry see Field 20F.
AD-646 515 HC$3.00 MF$0.65

INTERACTION OF ELEMENTARY PARTICLES WITH A GRAVITATIONAL FIELD IN THE GENERAL THEORY OF RELATIVITY AND IN GENERALIZED LINEAR THEORY OF GRAVITATION,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
M. P. Korkina. 30 Sep 66, 17p FTD-HT-66-177
TT-67-60851
Edited trans. of Ukrayinskyi Fizchnyi Zhurnal (USSR), v10 n5 p497-507 1965.

Descriptors: (*Elementary particles, *Relativity theory), (*Gravity, Elementary particles), (*Field theory, Gravity), Interactions, Electrons, Positrons, USSR.

The interaction is compared of a gravitational field with electromagnetic and electron-positron fields respectively, as well as the self-interaction of a gravitational field in the general theory of relativity and in a generalized linear theory of gravitation. The generalization of linear theory of gravitation amounts to taking into account the intrinsic nonlinearity of the gravitational field. The above-mentioned interactions are identical in both theories up to the second approximation in the gravitational constant alpha. If there are any discrepancies, they must be sought in the higher approximations. It is also shown that the linear approximation of the general theory of relativity contains, just as the linear theory of gravitation, arbitrary constants, and that Gupta's formulation is a particular case of the linear approximation of the general theory of relativity. The above method of analysis of the interaction with a gravitational field greatly simplifies the calculations and makes it possible to use flat metrics in all the approximations of the theory. (Author)
AD-646 518 HC$3.00 MF$0.65

MICROWAVE ABSORPTION SPECTRUM OF MAGNETICALLY ORDERED DYSPROSIUM METAL.
Interim rept.,
Harvard Univ., Cambridge, Mass. Gordon McKay Lab.
Frederick Carl Rossol. Nov 66, 248p Scientific-9-Ser-3
AFCRL-66-666
Contract AF 19 (628)-3874

Group 20H—Particle physics

Descriptors: (*Dysprosium, Absorption spectrum), (*Magnetic resonance, Dysprosium), Resonance absorption, Anisotropy, Ferromagnetic materials, Ground state, Excitation, Microwaves.

The heavy rare earth metals all crystallize in a hexagonal close-packed structure and exhibit a tendency toward spatially periodic ordering of magnetic moments at low temperatures. An experimental study was made of the excited states in such magnetic systems for the various phases of ground state ordering. Dysprosium was chosen because of the relative simplicity of its ground state ordering and because of the abundance of experimental evidence concerning its static magnetic properties. Ferromagnetic resonance was observed at 37 Gc/sec by using the anisotropy in the hexagonal plane. The temperature dependence of the field for resonance gives a measure of the temperature dependence of the hexagonal anisotropy which is in good agreement with the behavior estimated from static measurements of magnetization. The most striking feature of this resonance absorption is its extremely large width. Absorption measured at temperatures in the spiral range with the field applied along an easy axis in the hexagonal plane shows an abrupt increase corresponding to a sharp rise in permeability at the field required to induce ferromagnetic ordering. This abrupt change is followed at higher fields by a gradual fall-off of absorption consistent with the increasing separation of the resonant frequency above the experimental frequency at higher fields.
AD-646 572 HC$3.00 MF$0.65

RESONANCE POLES IN A SIMPLE MODEL OF S WAVE PSEUDOSCALAR MESON BARYON SCATTERING,
Illinois Univ., Urbana. Dept. of Physics.
For primary bibliographic entry see Field 20J.
AD-646 614 HC$3.00 MF$0.65

MEASUREMENT OF NEUTRON SPECTRUM, AGE, AND DIFFUSION LENGTH IN CONCRETE,
Virginia Univ., Charlottesville. Dept. of Nuclear Engineering.
Gene M. Lim, T. G. Williamson, and W. Reed Johnson. Jan 67, 30p
NDL-TR-84
Grant DA-AMC-18-135-65 (A)

Descriptors: (*Neutron spectrum, *Concrete), Neutron age, Fast neutrons, Thermal diffusion, Foils, Reactor shielding materials, Measurement, Thermal neutrons.

Activation foil detectors were used to measure the fast-neutron spectrum, slowing-down age, and thermal-diffusion length in concrete. The neutron source was a uranium fission plate placed in the graphite thermal column of the University of Virginia Reactor. Experimental concrete slabs were placed in the concrete biological shield of the reactor so that the medium was essentially infinite in the lateral direction. Indium, magnesium, and aluminum threshold foils were used to map the fast flux; indium, gold, tungsten, and manganese resonance foils to measure the neutron age; and indium and gold foils to measure the thermal neutron distribution. The fast spectrum retains essentially the fission shape with a slight dip in the 3- to 5-MeV range. The measured ages are essentially the same, 149 cm to the indium, gold, and tungsten resonances and 126 sq cm to the manganese resonances. The thermal diffusion length was measured as 6.0 plus or minus 0.5 cm. (Author)
AD-646 630 HC$3.00 MF$0.65

INFORMAL INTERNATIONAL HOT ATOM CHEMISTRY SYMPOSIUM (3RD), PURDUE UNIVERSITY, APRIL 1 AND 2, 1966.
Purdue Univ., Lafayette, Ind. Dept. of Chemistry.
For primary bibliographic entry see Field 7E.
AD-646 657 HC$3.00 MF$0.65

SHELL MODEL CALCULATION IN THE CALCIUM-ISOTOPES.
Michigan Univ., Ann Arbor. Dept. of Physics.
For primary bibliographic entry see Field 18B.
AD-646 702 HC$3.00 MF$0.65

GAMOW-TELLER BETA DECAY IN HEAVY SPHERICAL NUCLEI AND UNLIKE PARTICLE-HOLE RANDOM PHASE APPROXIMATION.
Carnegie Inst. of Tech., Pittsburgh, Pa. Dept. of Physics.
For primary bibliographic entry see Field 18H.
AD-646 749 HC$3.00 MF$0.65

A MODEL TO RELATE LEVELS IN AN ISOBARIC MULTIPLET,
California Inst. of Tech., Pasadena.
T. A. Tombrello. 30 Aug 66, 3p
Contract Nonr-220 (47)
Availability: Published in Physics Letters v23 n2 p134-6 Oct 10 1966.

Descriptors: (*Nuclear energy levels, *Nuclear models), Ground state, Excitation, Carbon, Nitrogen, Oxygen, Fluorine, Nuclear isobars, Helium, Lithium, Beryllium, Boron, Nuclear structure, Nucleons.

A simple two-body model is proposed for relating levels within an isobaric multiplet and is applied to the lowest T = 1 levels of the nuclei with A = 8 and A = 16. (Author)
AD-646 783 Not available from CFSTI.

ON THE ALPHA WIDTH OF THE 7.12-MEV STATE OF OXYGEN AND THE PRODUCTS OF HELIUM BURNING,
California Inst. of Tech., Pasadena.
For primary bibliographic entry see Field 3B.
AD-646 784 Not available from CFSTI.

MAGNETIC ANALYSIS OF THE Li6 (He3,t)Be6 REACTION.
Revised ed.,
California Inst. of Tech., Pasadena.
Ward Whaling. 6 Jun 66, 3p
Contract Nonr-220 (47)
Revision of manuscript submitted 11 Apr 66.
Availability: Published in Physical Review v150 n3 p836-8 Oct 21 1966.

Descriptors: (*Lithium, Ion bombardment), (*Tritons, Nuclear spectroscopy), Helium, Ion beams, Beryllium, Nuclear energy levels, Ground state, Decay schemes, Momentum, Magnetic fields, Particle trajectories.

The triton spectrum from the reaction Li6 (He3,t)Be6 was measured in a 61-cm double-focusing magnetic spectrometer at He3 bombarding energies of 10, 11, and 12 MeV, and at observation angles of 1.7 and 10 deg. A triton group corresponding to the Be6 ground-state transition was seen. The Q value for the ground-state transition is (-4.306 plus or minus 0.006) MeV, leading to a Be6-Li6 mass difference of 4.288 plus or minus 0.006 MeV, in good agreement with the values from the Li6 (p,n)Be6 threshold. The width of the ground state of Be6 is (89 plus or minus 6) keV. (Author)
AD-646 785 Not available from CFSTI.

EXCITATION OF SINGLE-PARTICLE STATES IN 8Be BY THE 9Be (p,d)8Be REACTION,
California Inst. of Tech., Pasadena.
J. B. Marion, C. A. Ludemann, and P. G. Roos. 27 Jun 66, 3p
Contract Nonr-220 (47)
Prepared in cooperation with Oak Ridge National Lab., Tenn.
Availability: Published in Physics Letters v22 n2 p172-4 Aug 1 1966.

Descriptors: (*Beryllium, *Proton reactions), (*Nuclear energy levels, Beryllium), Proton bombardment, Deuterons, Nuclear spectroscopy, Excitation, Nuclear isobars, Nuclear spins, Nucleons.

The 9Be (p,d)8Be reaction was studied at a bombarding energy level of 40.8 MeV. It is found that the 16.93 MeV level of 8Be is strongly excited whereas the 16.63 MeV level is not, in accordance with the prediction of the single-particle model for these isobaric-spin-mixed states. (Author)
AD-646 786 Not available from CFSTI.

THE IRON GROUP ELEMENTS AND THE EQUILIBRIUM PROCESS IN NUCLEOSYNTHESIS,
California Inst. of Tech., Pasadena.
For primary bibliographic entry see Field 3B.
AD-646 788 Not available from CFSTI.

LEVELS IN 11B FROM 7Li (ALPHA,ALPHA)7Li AND 7Li (ALPHA,ALPHA')7Li*. (0.48),
California Inst. of Tech., Pasadena.
R. Y. Cusson. Oct 66, 29p
Contract Nonr-220 (47)
Availability: Published in Nuclear Physics v86 n3 p481-508 1966.

Descriptors: (*Boron, *Nuclear energy levels), (*Lithium, *Alpha particle reactions), Differential cross section, Alpha bombardment, Nuclear scattering, Anomalies, Excitation, Nuclear spins, Parity, Center of mass, Carbon.

The absolute differential cross sections for the reactions 7Li (alpha,alpha')7Li and 7Li (alpha,alpha)7Li* (0.48) were measured using thin 7Li targets. Solid state detectors were used to detect the scattered alpha-particles. A total of 19 scattering anomalies was observed in this energy range. In the excitation energy range 9.88<or=Ex (11B)<or=11.27MeV, in which six levels were observed, the measured cross sections were fitted by using a multi-level R-matrix-theory program for the 7094 computer. The best fits were obtained with the spin and parity assignments 9.88 (3/2+), 10.26 (3/2-), 10.32 (5/2-), 10.60 (7/2+), 11.0 (5/2-), 11.27 (7/2+,9/2+). Some alternatives for these assignments are discussed. These results are consistent with what is known of the level structure of the analogue nucleus 11C. (Author)
AD-646 789 Not available from CFSTI.

ANNUAL SUMMARY REPORT COVERING PERIOD APRIL 1, 1966 - DECEMBER 31, 1966,
Yale Univ., New Haven, Conn. Gibbs Lab.
Vernon W. Hughes. Jan 67, 17p
Contract Nonr-609 (53)
See also AD-631 303.

Descriptors: (*Electrons, Polarization), (*Molecular beams, Lithium), (*Helium, Nuclear properties), Ionization, Photochemistry, Scattering, Meters, Nuclear magnetic moments, Nuclear magnetic resonance, Hydrogen, Nucleons, Anomalies.

Researches in the following areas are summarized: lithium-6 atomic beam source of polarized electrons; polarization detector for low energy electrons based on Mott scattering. A full length paper, 'The Magnetic Moment and HFS Anomaly for Helium-3', by W. L. Williams and V. W. Hughes, is included.
AD-646 830 HC$3.00 MF$0.65

A THEORETICAL ANALYSIS OF EXTENSIVE AIR SHOWERS. I. NEAR-VERTICAL SHOWERS AT SEA LEVEL,
Durham Univ. (England). Dept. of Physics.
For primary bibliographic entry see Field 7A.
AD-646 924 Not available from CFSTI.

THE REALIZATION OF PARTICLE-LIKE SOLUTIONS OF THE EINSTEIN EQUATIONS FOR A SCALER COMPLEX FIELD,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 20J.
AD-646 931 HC$3.00 MF$0.65

THE ICECREAM-CONE SINGULARITY IN S-MATRIX THEORY,
Cambridge Univ. (England). Dept. of Applied Mathematics and Theoretical Physics.
For primary bibliographic entry see Field 20J.
AD-646 936 Not available from CFSTI.

NORMAL THRESHOLDS IN SUBENERGY VARIABLES,
Cambridge Univ. (England). Dept. of Applied Mathematics and Theoretical Physics.
For primary bibliographic entry see Field 20J.
AD-646 937 Not available from CFSTI.

TESTS OF THE CONSEQUENCES OF UNITARY SYMMETRY IN HADRON PRODUCTION REACTIONS,
Division of Technical Information Extension (AEC), Oak Ridge, Tenn.
A. D. Dolgov, and V. V. Solovev. 1965, 90p
TT-67-61000
Trans. of Institut Teoreticheskoi i Eksperimentalnoi Fiziki. Rapport (USSR) n333 p100 1965.

Descriptors: (*Elementary particles, Nuclear reactions), (*Nuclear reactions, Predictions), Mesons, Scattering, Interactions.

For abstract, see NSA 21 04.
AEC-TR-6807 HC$3.00 MF$0.65

NEUTRON RESONANCES AND REACTIVITY,
Los Alamos Scientific Lab., N. Mex.
Carroll B. Mills. 15 Jun 66, 77p
Contract W-7405-eng-36
For abstract see NSA 21 05.

Descriptors: (*Neutron cross sections, Neutron flux), (*Neutron scattering, Neutron absorption), Elastic scattering, Inelastic scattering, Nuclear resonance, Monte Carlo method, Perturbation theory.
LA-3560-MS HC$3.00 MF$0.65

THE D3/2 NEUTRON SCATTERING RESONANCE IN THE SHELL MODEL OF O16.
Maryland Univ., College Park.
L. Garside, and W. M. Mac Donald. 1965, 5p
NASA-CR-81154
Grant NSG-642
Presented At The Intern. Conf. On The Study Of Nucl. Struct. With Neutrons, Antwerp, 19-23 Jul. 1965

Descriptors: *Hamiltonian, *Neutron scattering, *Oxygen, *Shell theory, Amplitude, Dispersion, Energy, Function, Model, Molecular, Neutron, Nucleon, Potential, Reaction, Resonance, Scattering, Shell, Shift, Theory, Wave.

For abstract, see STAR 05 06.
N67-15386 HC$3.00 MF$0.65

CISLUNAR ELECTRON CONTENT AS DETERMINED BY RADAR GROUP DELAY MEASUREMENTS.
Stanford Univ., Calif. Radioscience Lab.
H. T. Howard. Nov 66, 27p NASA-CR-81279, SEL-66-113
Grant NSG-377

Descriptors: *Cislunar space, *Ionospheric electron density, *Radar measurement, Cislunar, Density, Diurnal, Electron, Ionospheric, Measurement, Radar, Signal, Solar, Space, Variation, Wind.

For abstract, see STAR 05 06.
N67-15900 HC$3.00 MF$0.65

THEORETICAL INVESTIGATION OF THE ABSORPTIVE PROPERTIES OF SMALL PARTICLES AND HEAVY-ATOM GASES.
United Aircraft Corp., East Hartford, Conn.
N. L. Krascella. Jan 67, 74p NASA-CR-693
Contract NASW-847

Descriptors: *Absorption, *Particle property, *Rocket engine, Black, Body, Gaseous, Heavy, Index, Optical, Particle, Propellant, Property, Radiation, Scattering, Seed, Tungsten.

For abstract, see STAR 05 06.
N67-16501 HC$3.00 MF$0.65

THE OUTERMOST BELT OF CHARGED PARTICLES.
Consultants and Designers, Inc., Arlington, Va.
For primary bibliographic entry see Field 4A.
For abstract, see STAR 05 06.
N67-16505 HC$3.00 MF$0.65

ON THE COULOMB RELAXATION PROCESS OF FAST PARTICLES' DISTRIBUTION IN THE EARTH'S RADIATION BELTS.
Consultants and Designers, Inc., Arlington, Va.
For primary bibliographic entry see Field 4A.
For abstract, see STAR 05 06.
N67-16507 HC$3.00 MF$0.65

THE BEHAVIOR OF PARTICLES OF RADIATION BELTS DURING MAGNETIC STORMS.
Volt Technical Corp., Washington, D. C.
For primary bibliographic entry see Field 4A.
For abstract, see STAR 05 06.
N67-16508 HC$3.00 MF$0.65

VAN ALLEN BELT PLASMA PHYSICS.
Avco-everett Research Lab., Everett, Mass.
For primary bibliographic entry see Field 4A.
For abstract, see STAR 05 06.
N67-16511 HC$3.00 MF$0.65

VIRTUAL TRANSITIONS TO THE CONTINUUM IN O16.
Maryland Univ., College Park. Dept. of Physics and Astronomy.
W. P. Beres. Aug 66, 15p NASA-CR-81336, TR-611
Grant NSG-642

Descriptors: *Energy level, *Nuclear interaction, *Shell theory, *Two-body problem, Body, Calculation, Continuum, Energy, Interaction, Level, Model, Momentum, Negative, Neutron, Nuclear, Oxygen, Parity, Proton, Shell, Shift, Theory, Transition, Two.

For abstract, see STAR 05 06.
N67-16629 HC$3.00 MF$0.65

PRODUCTION DE L'ISOBARE N33* ++ ET INTERACTION PION + PION DANS L'ETAT D'ISOSPIN I = 2, ETUDIEES DANS LA REACTION PI-MINUS + p TO p + PI-PLUS + PI-MINUS + PI-MINUS A 2, 75 GeV/c (N33* ++ Isobar Production and Isopin 2 Pion + Pion Interaction Studied in the Reaction Pi-minus + p to p + Pi-plus + Pi-minus + Pi-minus at 2.75 GeV/c).
Doctoral thesis in French,
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
Alitti Jean. 1967, 81p CEA-R-3035
Text in French, attached summary in English.

Descriptors: (*Nuclear isobars, Nuclear reactions), (*Meson reactions, Nuclear isobars), (*Pions, Meson reactions), Proton reactions, Center of mass, Decay schemes, Nuclear spins, Meson cross sections, Phase shift, France.

A study of the reaction pi-minus + p to p+ pi-plus + 2 pi-minus at 2.75 GeV/c was carried out in the Saclay 81 cm liquid hydrogen bubble chamber at the CERN proton synchroton. It was observed that the abundant N33*++ (1236 MeV) isobar production occurs predominantly backwards in the center of mass of the reaction. This feature suggests a peripheral production mechanism with pion exchange. The validity of this hypothesis was checked which permitted the study of the pi-minus + pi-minus interaction within the frame of the Chew and low model. Among other results one gives for the isospin 2 state the values of the elastic pion-pion cross section anu of the S and D wave phase shifts. (Author)
PB-174 031 HC$3.00 MF$0.65

CONTRIBUTION A L'ETUDE DES DIFFUSIONS ELASTIQUE ET INELASTIQUES DES PROTONS SUR LE CARBONE 12 (Contribution to the Study of Proton Elastic and Inelastic Scattering on Carbon-12).
Doctoral thesis,
Commissariat a l'Engergie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
Ali Sadeghi. 1966, 69p CEA-R-3006
Text in French, summary in English.

Descriptors: (*Proton scattering, Nuclear cross sections), (*Carbon, Proton scattering), Elastic scattering, Inelastic scattering, Nuclear energy levels, Nuclear models, France.

The results of absolute measurements of cross sections of scattering (p,p) and (pp') (to the two first excited levels) of protons by carbon-12 are given. The measurements are made from 4.6 to 11.4 meV, at 17 angles for (p,p), at 15 angles for pp', (1st excited level, and at 8 angles for (pp') (2nd excited level). A gaseous target with differential pumping was used. The elastic scattering was analyzed with the R matrix theory with optical model for elastic scattering. Then a new analysis of both (p,p) and (pp') was achieved using the coupled waves formalism. The information on the levels of compound nucleus was completed and confirmed. (Author)
PB-174 032 HC$3.00 MF$0.65

INTERACTIONS A DEUX CORPS DANS LA REACTION 9Be (n, ALPHA ALPHA nn) A 14 MeV. II - MESURE DES SECTIONS EFFICACES (Two-Body Interaction in the Reaction 9Be (n, Alpha Alpha nn) at 14 MeV, II. Cross-Section Measurements).
Doctoral thesis,
Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
Alain Giorni. Nov 66, 49p CEA-R-2986
Text in French, attached summary in English. See also PB-173 390.

Descriptors: (*Beryllium, *Neutron reactions), (*Neutron cross sections, Measurement), Alpha particle reactions, Differential cross section, Decay schemes, Interactions, Nuclear spectroscopy, France.

Measurement was made with a double time of flight spectrometer the momenta of neutrons from the 9Be (n,nn)alpha,alpha reaction at En = 14MeV. After the analysis of correction factors for the measurement of differential cross-sections, appraisal is made of the importance of different interactions (nn,8Be (0+) : 1.8 plus or minus 0.4 mb/sq sr, nn8Be (2+) : 2 plus or minus 0.4 mb/sq sr, n9Be, n8Be,alpha-alpha) observed. (Author)
PB-174 033 HC$3.00 MF$0.65

PROPOSITIONS POUR LE MECHANISME D'ECHAUFFEMENT D'UN CORPS PAR BOMBARDEMENT ELECTONIQUE (Proposals for the Heating Mechanism of an Electronically Bombarded Body),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
Richard Geller, and Francoise Yerouchalmi. Jan 67, 18p CEA-R-3139
Text in French, attached summary in English.

Descriptors: (*Tungsten, *Electron bombardment), (*Particle accelerator targets, Heating), Energy conversion, Thermal radiation, Interactions, Elastic scattering, Inelastic scattering, Photons, Kinetic energy, Emissivity.
Identifiers: Photon emissivity.

When a thermally isolated target in vacuum is bombarded by an electron beam the target becomes red. A heuristic explanation is given indicating how the kinetic power of the beam may be transformed into radiation power controlled by Stefan's law. (Author)
PB-174 038 HC$3.00 MF$0.65

SECTIONS EFFICACES DIFFERENTIELLES ELASTIQUES ET INELASTIQUES OBTENUES PAR DIFFUSION DE PARTICULES ALPHA DE 44 MeV SUR DES CIBLES DE: 24Mg, 25Mg, 26Mg, 40Ca, 46Ti, 48Ti, 50Ti, 52Cr, 54Fe, 56Fe, 58Fe, 58Ni, 60Ni, 62Ni, 64Ni, 63Cu, 65Cu, 64Zn, 112Sn, 114Sn, 116Sn, 118Sn, 120Sn, 122Sn, 124Sn ET 208Pb AU CYCLOTRON A ENERGIE FIXE DE SACLAY,
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
Gaston Bruge. Jan 67, 37p CEA-R-3147
Text in French; Attached summary in English.

Descriptors: (*Alpha particle reactions, Nuclear scattering), (*Particle accelerator targets, Alpha particle reactions), (*Alpha cross sections, Metals), Cyclotrons, Magnesium, Calcium, Titanium, Chromium, Iron, Nickel, Copper, Zinc, Tin, Lead, Alpha bombardment, Elastic scattering, Inelastic scattering, Differential cross section, Tables, France.

The report contains elastic and inelastic alpha-scattering cross-sections obtained with the 44 MeV fixed energy Saclay cyclotron on Mg, Ca, Ti, Cr, Fe, Ni, Cu, Zn, Sn and Pb enriched targets. (Author)
PB-174 040 HC$3.00 MF$0.65

IONISATION D'UN ATOME DE CESIUM PAR UN PROCESSUS D'ABSORPTION A DEUX PHOTONS ISSUS D'UN FAISEAU LASER (Ionisation of a Cesium Atom by an Absorption Process Involving two Photons from a Laser Beam),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
Yves Gontier, and Michel Trahin. Jan 67, 37p CEA-R-3113
Text in French, summary in English.

Descriptors: (*Coherent radiation, Gas ionization), (*Cesium, Ionization), (*Atomic orbitals, Excitation), Photons, Absorption, Probability, Lasers, Dipole moments, Differential cross section, Field theory, Wave functions, Numerical analysis, France.

The expression giving the ionisation cross-section of an atom, by an absorption process involving two photons produced from a laser beam, is derived. The non-relativistic case is considered and the dipolar approximation used. The summation over the intermediate states is carried out rigorously by means of a special technique which is described in detail. A method is presented which makes it possible to obtain the numerical solution. (Author)
PB-174 043 HC$3.00 MF$0.65

MESURE D'UN FLUX DE PARTICULES NEUTRES PAR UNE METHODE THERMIQUE METTANT A CONTRIBUTION L'EFFET DE TEMPERATURE DES JONCTIONS (Measurement of a Neutral Particle Flux by a Thermal Method Using the Junction Temperature Effect),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
Anthime Caron. Dec 66, 76p CEA-R-3094
Text in French; attached summary in English.

Descriptors: (*Proton bombardment, Organic materials), (*Particles, Scattering), Test equipment, Thermocouples, Calibration, Particle accelerators, Transistors, France.

Among all the methods suitable for measuring neutral particle fluxes obtained by proton charge exchange in an organic gas, the thermal method was chosen. The energy imparted by the neutral particles to the target in the form of heat leads to the latters temperature increasing; this temperature is usually followed with a thermocouple. In order to increase the sensitivity and the elegance of the apparatus the thermocouple was replaced by a junction whose characteristics are known to vary with temperature. A calibration is carried out using a beam of charged particles. The response obtained is linear. Measurements were made with a power of up to 1 mW; the accuracy increases with the energy provided; for 4 joules an accuracy of 10 per cent is obtained. The apparatus may be improved in particular by extending the measurement range towards low power values, and by increasing the accuracy. (Author)
PB-174 048 HC$3.00 MF$0.65

COMPUTER-ORIENTED NEUTRON DATA STORAGE AND RETRIEVAL SYSTEM,
California Univ., Livermore. Lawrence Radiation Lab.
W. J. Cahill, D. W. Thompson, and S. T. Perkins. 23 Sep 66, 35p
Contract W-7405-eng-48

Descriptors: (*Neutrons, Data storage systems), (*Information retrieval, Neutrons), Programming (Computers).

For abstract, see NSA 21 04.
UCRL-50132 HC$3.00 MF$0.65

20I. PLASMA PHYSICS

ELECTRON RECOMBINATION IN LASER-PRODUCED HYDROGEN PLASMA.
Revised ed.,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
M. M. Litvak, and David F. Edwards. 4 May 66, 13p
Revision of manuscript submitted 25 Nov 65. Research supported in part by USAF.
Availability: Published in Journal of Applied Physics v37 n12 p4462-74 Nov 1966.

Descriptors: (*Plasma physics, *Hydrogen), (*Electron density, Plasma physics), Recombination reactions, Temperature, Lasers, Stark effect, Spectroscopy, Absorption, Gas discharges.

Time-resolved spectroscopic measurements were made of the decay of a laser-produced discharge in hydrogen over a range of pressures from 1 to 70 atm. Stark widths and line-to-continuum intensity ratios yielded the electron density, and temperature time history, which indicated temperature decay because of radiation, and expansion cooling and electron loss because of collisional-radiative recombination, as verified by solutions obtained from the rate and energy equations. (Author)
AD-646 476 Not available from CFSTI.

INVESTIGATION OF ELECTRIC ARC INTERACTION WITH AERODYNAMIC AND MAGNETIC FIELDS.
Final scientific rept.,
Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
W. C. Roman, and T. W. Myers. Sep 66, 70p
ARL-66-0191

Descriptors: (*Electric arcs, *Magnetohydrodynamics), Interactions, Arc heaters, Gas flow, Magnetic fields, Wind tunnels, Wake, Energy, Vortices, Convection (Heat transfer).

An experimental study of a balanced electric arc of 200 to 400 amperes in an atmospheric pressure cross-flow air stream of velocities up to 60 ft/sec and transverse magnetic field strengths up to 50 gauss was made. An open-jet type facility permitted the use of diagnostic techniques in the arc wake region. The arc's significant dimension transverse and parallel to the flow was measured. This dimension increased transverse to the flow and decreased parallel to the flow as the transverse blowing velocity was increased. Velocity profiles, energy flux distributions, relative turbulence levels and frequency measurements were obtained in the arc wake using miniaturized probe techniques. Flow visualization studies were performed using micron-sized particles. The input and output arc power distribution was obtained. The energy convectively transferred to the arc wake was equal to the additional electrical energy input required to maintain the arc in the presence of the transverse blowing. A drag coefficient for the arc, analogous to that of a solid cylinder subjected to a cross-flow, was defined and measured to have values between 0.7 and 1.2. Comparisons between the wake of an arc and that of a heated solid cylinder indicated similarity in vortex shedding frequency and convective heat transfer. (Author)
AD-646 589 HC$3.00 MF$0.65

EXPERIMENTS ON THE APPLICATION OF ELECTRON SCATTERING TO PLASMA DIAGNOSTICS,
Toronto Univ. (Ontario). Inst. for Aerospace Studies.
E. L. Battle. Dec 66, 140p UTIAS-120
Contract Nonr-4073 (00)

Descriptors: (*Plasma medium, Analysis), (*Electron beams, Scattering), Feasibility studies, Plasma oscillations, Electron density, Canada.
Identifiers: Plasma diagnostics.

An experimental apparatus was constructed to test the concept of using Coulomb scattering of injected electron beams as a plasma diagnostic technique. The experimental conditions were chosen to avoid multiple scattering and plasma oscillation coupling with the beam insofar as possible. The data obtained indicated that these effects were avoided and that the single Coulomb-Rutherford collision model was the proper one for describing the results over the range of electron densities investigated. Extensive validation experiments were conducted to insure sufficient accuracy of Langmuir probe measurements, which were used for comparison purposes, and the absence of any spurious effects which could influence the beam scattering measurements. Theoretical values of cross-sections were derived by averaging the Rutherford results over the length of the interaction zone and over the width of the beam, using experimental data for spatial charge distribution and beam intensity profiles. These values were within 15 percent of the experimentally measured cross-sections. The influence of detector angular resolution and beam energy were also measured and found to be in good agreement with Rutherford theory. It was concluded that it is indeed feasible to use an electron beam for plasma diagnositics. (Author)
AD-646 611 HC$3.00 MF$0.65

ELECTRICAL CONDUCTIVITY OF A PLASMA.
Final technical rept., 1 Oct 63-30 Sep 66,
Brown Univ., Providence, R. I. Div. of Engineering.
P. F. Maeder. 30 Nov 66, 8p
AFOSR-67-0306
Contract AF 49 (638)-1295

Descriptors: (*Plasma medium, *Electrical conductance), Magnetic fields, Electric fields, Shock waves, Air, Gas ionization, Magnetohydrodynamics.

The work encompassed both equilibrium and nonequilibrium plasmas in the presence of externally applied magnetic or electric fields. The experimental techniques employed were primarily those developed previously for work with high temperature gases, but extended to accommodate the nonequilibrium plasma tests and improved to permit measuring shock speeds in gases other than air. (Author)
AD-646 672 HC$3.00 MF$0.65

THE EFFECTS OF PARTIAL CONDENSATION AROUND IONS IN ELECTRIC FLUID DYNAMIC ENERGY CONVERSION PROCESSES.
Aerospace Research Labs., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 10B.
AD-646 740 HC$3.00 MF$0.65

NOISE CONSIDERATION FOR THE DETECTION OF WEAK LASER SIGNALS.
RCA Victor Co., Ltd., Montreal (Quebec). Research Labs.
For primary bibliographic entry see Field 20E.
AD-646 744 HC$3.00 MF$0.65

SURVEY OF INVESTIGATIONS OF ELECTRIC ARC INTERACTIONS WITH MAGNETIC AND AERODYNAMIC FIELDS.
Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 20C.
AD-646 752 HC$3.00 MF$0.65

THE FLAT-PLATE MAGNETOHYDRODYNAMIC BOUNDARY LAYER IN A TRANSVERSE MAGNETIC FIELD.
Technical note,
Toronto Univ. (Ontario). Inst. for Aerospace Studies.
J. K. Dukowicz. Jan 67, 31p UTIAS-TN-68
AFOSR-67-0004
Grant AF-AFOSR-366-66

Descriptors: (*Magnetohydrodynamics, *Boundary layer), Flat plate models, Magnetic fields, Equations of motion, Incompressible flow, Canada.

The equations of motion for a flat plate boundary layer flow of an incompressible, electrically conducting fluid in the presence of a transverse magnetic field moving with the main stream velocity were solved numerically for the case of negligible induced magnetic field. The equations of motion were transformed into a universal form with no characteristic parameters present. The velocity profiles were calculated as they range from the Blasius profile to the asymptotic exponential profile. The error due to the finite-difference solution was also calculated. (Author)
AD-646 773 HC$3.00 MF$0.65

ONE-DIMENSIONAL ANALYSIS OF A TRAVELLING WAVE ACCELERATOR.
Innsbruck Univ. (Austria). Inst. for Theoretical Physics.
For primary bibliographic entry see Field 20G.
AD-646 778 HC$3.00 MF$0.65

MAGNETOHYDRODYNAMIC LUBRICATION FLOW BETWEEN PARALLEL PLATES.
Chicago Univ., Ill.
For primary bibliographic entry see Field 11H.
AD-646 806 Not available from CFSTI.

RESEARCH STUDIES OF HIGH-DENSITY PLASMAS.
Quarterly progress rept. no. 8, 15 Jun-15 Sep 66,
Illinois Univ., Urbana. Dept. of Electrical Engineering.
E. Bialecke, E. Vesely, T. V. George, L. Dreyer, and T. Dolan. Jan 67, 39p
ECOM-00094-8
Contract DA-28-043-AMC-00094 (E)

Descriptors: (*Plasma medium, Physical properties), Electron density, Distribution, Measurement, Interferometers, Electrical conductance, Resistance (Electrical), Gas discharges, Hydrogen, Magnetic pinch, Impurities, Helium group gases, Electronic switches.

Experiments to determine the spatial and temporal variations of the electron distribution of the high-density plasma were made using a laser interferometer with increased sensitivity. Spatial and temporal determination of the conductivity of the plasma was continued using this method and is described. Experimental determination of the plasma resistance was made. Also, its variation was noted to changes in hydrogen gas pressure and different capacitor bank voltages. Further experiments were made to determine the effects on the plasma resistance when impurity gases such as neon, krypton and xenon were added to the hydrogen gas. (Author)
AD-646 889 HC$3.00 MF$0.65

ELECTRON-HEAVY PARTICLE NONEQUILIBRIUM IN A DENSE ARGON PLASMA.
Interim rept. 1 Sep 64-31 Aug 65,
Princeton Univ., N. J. Dept. of Aerospace Mechanical Sciences.
Paul F. Jacobs, and Jerry Grey. Jul 66, 192p
Rept. no. 763
ARL-66-0143
Contract AF 33 (657)-9962

Descriptors: (*Plasma medium, Thermal properties), Electron density, Argon, Temperature, Electric arcs, Probes, Gas flow, Turbulence, Nonequilibrium flow, Atoms, Electrostatics, Ions, Langmuir probes.
Identifiers: Plasma diagnostics.

A theoretical and experimental study of the degree of electron heavy particle thermal nonequilibrium was conducted for a subsonic argon arcjet plasma at one atmosphere. A criterion for 'electron-temperature freezing' was calculated, and indicated that although electron and heavy-particle temperatures were quite close to each other under typical arcjet environments, measurable departures should be observed at the lower temperature or density conditions. These analytical findings were verified quantitatively by simultaneous experimental measurements of the local electron temperature and heavy-particle temperature in the arcjet. These measurements were made with a unique water-cooled calorimetric-electrostatic probe. Proper interpretations of the electrostatic probe data in a dense plasma (argon at 1 atm) was verified by three accurate independent measurements (calorimetric, log current vs voltage, and saturation current ratio). It was also concluded that under certain (typical) conditions, the cooled electrostatic probe could provide a good approximation to the electron density in a dense plasma, and could provide an indication of plasma flow turbulence. (Author)
AD-646 891 HC$3.00 MF$0.65

THREE-DIMENSIONAL PLASMA ACCELERATION THROUGH AXISYMMETRIC DIVERGING MAGNETIC FIELDS BASED ON DIPOLE MOMENT APPROXIMATION.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
H. G. Kosmahl. Jan 67, 28p NASA-TN-D-3782
Contract 120-26-03-00-22

Descriptors: *Dipole moment, *Electromagnetic field, *Particle trajectory, *Plasma acceleration, *Propulsion system, Acceleration, Accelerator, Axisymmetry, Continuity, Dimensional, Dipole, Divergence, Electromagnetic, Electron, Energy, Field, Ion, Microwave, Moment, Momentum, Particle, Plasma, Poisson equation, Power, Propulsion, System, Three, Trajectory.

For abstract, see STAR 05 06.
N67-15663 HC$3.00 MF$0.65

CURRENT DISTRIBUTION IN PERMEABLE ELECTRODES INFLUENCED BY THE HALL EFFECT IN THE FLOW OF AN ELECTRICALLY CONDUCTING MEDIUM.
O Raspredelenii Toka Na Pronitsayemykh Elektrodakh Pri Nalichii Effekta Kholla V Potoke Elektroprovodnoy Sredy
National Aeronautics and Space Administration, Washington, D. C.
YU. P. Yemets. Dec 66, 13p NASA-TT-F-10496
Transl. Into English From Zh. Prik. Mekhan. I Techn. Fiz. (Moscow), No. 3, 1966 P 35-41

Descriptors: *Current distribution, *Diffusion electrode, *Hall effect, *Incompressible flow, Calculation, Channel, Conducting, Control, Current, Diffusion, Distribution, Electric, Electrode, Equation, Flow, Incompressible, Magnetohydrodynamic, Wall.

For abstract, see STAR 05 06.
N67-15696 HC$3.00 MF$0.65

CHEMICAL EQUILIBRIUM OF MULTITEMPERATURE SYSTEMS.
Khimicheskoye Ravnovesiye Mnogotemperaturnykh Sistem
National Aeronautics and Space Administration, Washington, D. C.
A. V. Potapov. Dec 66, 7p NASA-TT-F-10495
Transl. Into English From Teplofiz. Vysokikh Temperatur, Akad. Nauk Sssr (Moscow), V. 4, No. 1, 1966 P 55-58

Descriptors: *Chemical equilibrium, *Electron temperature, *Ionization, Chemical, Electron, Energy, Equilibrium, Gas, Heavy, Ideal, Mass, Molecule, Particle, Physics, Plasma, Temperature.

For abstract, see STAR 05 06.
N67-15841 HC$3.00 MF$0.65

CALCULATION OF THE EFFECT OF VISCOUS DRAG ON THE PERFORMANCE OF A COAXIAL PLASMA GUN.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
J. Norwood, Jr., Jan 67, 27p NASA-TN-D-3796

Descriptors: *Boundary layer transition, *Ion impact, *Plasma electrode, *Viscous drag, Boundary, Deterioration, Drag, Effect, Electrode, Energy, Gun, Impact, Ion, Layer, Model, Oscillation, Performance, Plasma, Pulse, Theoretical, Transition, Turbulent, Viscous.

For abstract, see STAR 05 06.
N67-15960 HC$3.00 MF$0.65

TWO-DIMENSIONAL UNSTEADY FLOW IN A TRAVELING WAVE PLASMA ACCELERATOR.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

Group 20I—Plasma physics

R. Peyret. 1 Feb 67, 30p NASA-CR-81298, JPL-TR-32-1018
Contract NAS7-100

Descriptors: *Perturbation theory, *Plasma accelerator, *Traveling wave, *Two-dimensional flow, *Unsteady flow, Accelerator, Differential, Dimensional, Electromagnetic, Equation, Flow, Interaction, Laplace transform, Partial, Perturbation, Plasma, Theory, Travel, Two, Unsteady, Wave.

For abstract, see STAR 05 06.
N67-16558 HC$3.00 MF$0.65

INTERACTION BETWEEN ION BEAMS AND PLASMAS.
California Univ., Los Angeles.
D. Baker, J. M. Sellen, and A. W. Wong. 1 Dec 66, 14p NASA-CR-81340, N-2
Contract NGR-05-007-66

Descriptors: *Cesium ion, *Ion beam, *Plasma stability, *Thermal plasma, Acoustic, Attenuation, Beam, Cesium, Field, Interaction, Ion, Low energy, Low frequency, Magnetic, Oscillation, Phase, Plasma, Stability, Thermal, Velocity, Wave.

For abstract, see STAR 05 06.
N67-16618 HC$3.00 MF$0.65

THEORY OF ELECTROSTATIC PLANAR AND SPHERICAL PROBES.
Mount Auburn Research Associates, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 4A.
For abstract, see STAR 05 06.
N67-16671 HC$3.00 MF$0.65

DETECTION ET ANALYSE DES PARTICULES CHARGEES ET NEUTRES APPLIQUEES A L'ETUDE DES PLASMAS CHAUDS (Detection and Analysis of Neutral and Charged Particles Applied to the Study of Hot Plasmas),
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
Claude Renaud. Dec 66, 71p CEA-R-3129
EUR-3225-f
Text in French, attached summary in English.

Descriptors: (*Plasma medium, Energy), Distribution, Ions, Exchange reactions, Ionic current, Detectors, Containment, Charged particles, France.

To measure the energy spectrum of ions in a plasma, one must extract the ions without altering the spectrum. For a dense plasma this presents difficulties; one method is the measurement of the energy spectrum of atoms produced by charge-exchange reactions of ions with residual gas. The measurements of both the energy spectrum and the flux of atoms leaving the magnetic configuration of the device DECA II (Dispositif d'Etude de Compression Adiabatique) are made by: an ion detector which permits the measurement of ion currents > or = 10 to the -16th power A, an electrostatic analyser of energy range 10 eV - 10 keV, a magnetic analyser for ion momentum < or = 100,000 gauss-cm, and a gas cell to convert fast atoms into ions. (Author)
PB-174 036 HC$3.00 MF$0.65

PROPAGATION ET DIFFUSION D'UNE COLONNE DE PLASMA DANS UN CHAMP MAGNETIQUE (Propagation and Diffusion of a Plasma Column in a Magnetic Field),
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
Franco Bottiglioni, Jacques Coutant, Erio Gadda, and Francois Prevot. Dec 66, 37p CEA-R-3130
EUR-3228-f
Text in French, attached summary in English.

Descriptors: (*Plasma medium, Diffusion), Propagation, Magnetic fields, Hydrogen, Density, France, Gas discharges.

A plasma column is created in a magnetic field by longitudinal diffusion from a low-pressure pulsed discharge in hydrogen. Depending on the discharge conditions, two regimes are obtained in which the gas pumping speed has a different effect upon the plasma density in the column. Calculations are presented which can explain this effect by a difference in the transverse diffusion coefficient. (Author)
PB-174 037 HC$3.00 MF$0.65

IONISATION D'UN ATOME DE CESIUM PAR UN PROCESSUS D'ABSORPTION A DEUX PHOTONS ISSUS D'UN FAISEAU LASER (Ionisation of a Cesium Atom by an Absorption Process Involving two Photons from a Laser Beam),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 20H.
PB-174 043 HC$3.00 MF$0.65

CINEMATOGRAPHIE DE PHENOMENES TRANSITOIRES FAIBLEMENT LUMINEUX A L'AIDE D'AMPLIFICATEURS DE LUMINANCE (Cinematography of Weakly-Luminous Transient Phenomena Using Image Converters),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 14B.
PB-174 046 HC$3.00 MF$0.65

20J. QUANTUM THEORY

QUANTUM-MECHANICAL EXTENSION OF THE LEBOWITZ-PENROSE THEOREM ON THE VAN DER WAALS THEORY,
Yeshiva Univ., New York. Belfer Graduate School of Science.
Elliott Lieb. 1 Nov 65, 12p
AFOSR-67-0033
Grants AF-AFOSR-508-66, AF-AFOSR-713-64
Availability: Published in Journal of Mathematical Physics v7 n6 p1016-24 Jun 1966.

Descriptors: (*Particles, Interactions), (*Fermions, Quantum statistics), (*Bosons, Quantum statistics), (*Quantum statistics, Theorems), Statistical mechanics, Phase studies, Potential theory, Gases, Kinetic theory.

Recently Lebowitz and Penrose gave a rigorous derivation of the van der Waals-Maxwell theory of the liquid-vapor transition, and showed how the Maxwell equal area-rule could be obtained from a proper statistical mechanical calculation. Their results are quite general-being valid in any number of dimensions and for a broad class of pair potentials-but they were proved only for classical mechanics. The proof is now extended to quantum systems with any statistics-Boltzmann, Bose, or Fermi. One corollary of this extended theorem is a model of a Bose gas with a first-order phase transition. (Author)
AD-646 407 Not available from CFSTI.

DYNAMICS AT INFINITE MOMENTUM,
California Univ., Berkeley. Dept. of Physics.
Steven Weinberg. 6 Jun 66, 8p
AFOSR-67-0058
Grant AF-AFOSR-232-66
Availability: Published in Physical Review v150 n4 p1313-8 Oct 28 1966.

Descriptors: (*Decay schemes, Algebras), (*Perturbation theory, Momentum), (*Relativity theory, Momentum), Diagrams, Nuclear scattering, Interactions, Integral equations, S-matrix, Invariance.
Identifiers: Current algebras.

Old-fashioned perturbation theory is applied to a relativistic theory in a reference frame with infinite total momentum. It is found that many undesirable diagrams disappear. The contribution of the remaining diagrams is described by a new set of rules with properties intermediate between those of Feynman diagrams and old-fashioned diagrams, e.g., energy denominators become covariant, and Feynman parameters appear naturally. The new rules are used to derive some integral equations. (Author)
AD-646 409 Not available from CFSTI.

CURRENT-COMMUTATOR CALCULATION OF THE Kl4 FORM FACTORS.
Interim rept.,
California Univ., Berkeley. Dept. of Physics.
Steven Weinberg. 6 Jul 66, 7p
AFOSR-67-0059
Grant AF-AFOSR-232-66
Availability: Published in Physical Review Letters v17 n6 p336-40 Aug 8 1966.

Descriptors: (*Decay schemes, Algebras), (*Pions, Interactions), Meson reactions, K mesons, Vector analysis, Nuclear scattering, Theory.
Identifiers: Current algebras, Form factors, Partial conservation of axial-vector currents.

In the past few years it has become possible to use the hypothesis of a partially conserved axial-vector current and the current commutation relations (PCAC and CCR) to obtain matrix elements for emission or scattering of low-energy pions. One of the most impressive results of this sort is a formula for a Kl3 form factor, derived by Callan and Treiman, (Phys. Rev. Letters v16 p153 1966), which agrees very well with experiment. However, the same authors concluded that the final-state pion-pion interaction makes the Kl4 form factors vary too rapidly to allow a meaningful confrontation of PCAC and CCR with present experimental data on Ke4 decay. It is now shown that Callan and Treiman were too pessimistic, and that in fact using the full strength of PCAC and CCR allows an unambiguous calculation for all Kl4 form factors, with results in excellent agreement with experiment. Final-state interactions are neglected throughout, so the success of this calculation not only offers more support for PCAC and CCR, but also strongly supports the recent prediction of small pion-pion scattering lengths.
AD-646 410 Not available from CFSTI.

COLLECTIVE NUCLEAR 'BREATHING MODE' MODEL WITH APPLICATION TO 4He MONOPOLE STATE.
Revised ed.,
Catholic Univ. of America, Washington, D. C. Dept. of Physics.
Carl Werntz, and H. Uberall. 19 Apr 66, 8p
AFOSR-67-0025
Grant AF-AFOSR-566-66
Revision of manuscript submitted 3 Jan 66. Research supported in part by NSF.
Availability: Published in The Physical Review v149 n3 p762-7 Sep 23 1966.

Descriptors: (*Nuclear energy levels, *Nuclear models), (*Helium, Nuclear models), Nuclear scattering, Nuclear cross sections, Wave functions, Excitation.

A new collective model of the nuclear breathing mode is presented which avoids the usual assumption of a constant nuclear ground-state density. The 20.4-MeV 0+ state in Hellium-4 is treated as an example of such a breathing-mode state. (Author)
AD-646 434 Not available from CFSTI.

INTERACTION OF ELEMENTARY PARTICLES WITH A GRAVITATIONAL FIELD IN THE GENERAL THEORY OF RELATIVITY AND IN GENERALIZED LINEAR THEORY OF GRAVITATION,

Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 20H.
AD-646 518 HC$3.00 MF$0.65

QUANTUM THEORY OF MEASUREMENT IN RELATION TO A GENERAL THEORY OF OBSERVATION AND CONTROL.
Final rept., 1 Jul 65-31 Jun 66,
Boston Univ., Mass. Dept. of Physics.
Marcus C. Goodall. Aug 66, 60p
AFCRL-66-646
Contract AF 19 (628)-5119
See also AD-616 949.

Descriptors: (*Quantum mechanics, *Mathematical logic), (*Measurement, Theory), (*Control, Theory), Field theory, Relativity theory, Projective geometry, Algebraic geometry, Pseudo-random systems, Polarization, Tensor analysis, Number theory.

Part I discusses the unsolved logical problems of quantum mechanics insofar as they affect its interpretation as a theory of observation and control. In particular the notion of 'interpretive sets' is introduced as a way of avoiding the strong atomicity postulate which is considered to be the essential source of these difficulties. A basic postulate underlying the theory of physical measurement is then that these sets satisfy a certain three-way symmetry principle. Part II is concerned with the consequences of this principle (Triality) for a semi-classical field theory, that is one that does not make explicit use of interpretive sets. It is indicated in Part I that a full development of this theory would require a sheaf-theoretic approach, where the geometric structure is supported by an algebraic one. (Author)
AD-646 571 HC$3.00 MF$0.65

QUARTERLY PROGRESS REPORT NO. 63 OF SOLID-STATE AND MOLECULAR THEORY GROUP.
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 20J.
AD-646 582 HC$3.00 MF$0.65

QUARTERLY PROGRESS REPORT NO. 63 OF SOLID-STATE AND MOLECULAR THEORY GROUP.
Massachusetts Inst. of Tech., Cambridge.
15 Jan 67, 49p
Contract Nonr-1841 (34), Grant NSF-G-24908
See also AD-642 566.

Descriptors: (*Solid state physics, Reviews), (*Molecular properties, Reviews), (*Iron, *Band theory of solids), (*Tin, Band theory of solids), (*Copper, Crystal lattice defects), (*Crystal lattice defects, Functions), Ferromagnetic materials, Nuclear spins, Atomic energy levels, Potential theory, X-ray diffraction analysis, Neutron diffraction analysis, Relativity theory, Differential equations.
Identifiers: Augmented plane wave methods.

Contents: Calculations of charge and spin densities for iron, by P. DeCicco and A. Kitz; A preliminary note on symmetrizing the relativistic APW calculations, by D. Koelling; Electronic states of magnetic impurities in nonmagnetic metals, by J. Sokoloff; The A.P.W. Eigenfunctions for the deformed lattice, by J. F. Kenney.
AD-646 582 HC$3.00 MF$0.65

RESONANCE POLES IN A SIMPLE MODEL OF S WAVE PSEUDOSCALAR MESON BARYON SCATTERING,
Illinois Univ., Urbana. Dept. of Physics.
R. K. Logan, and H. W. Wyld, Jr. 1966, 17p
Grant NSF-GP-6198
Research supported in part by NONR.

Descriptors: (*Meson scattering, Nuclear resonance), (*Baryons, Nuclear scattering), Mathematical models, S-matrix, Potential scattering, Groups (Mathematics), Wave functions.

In an earlier work (see AD-636 763) a numerical calculation was made of S wave pseudoscalar meson baryon scattering in a simple broken SU (3) model based on a static vector meson exchange potential and coupled channel Schrodinger equation. In the present work these calculations are extended to finding the location of the poles of the scattering matrix in the multisheeted complex energy plane and the motion of these poles as the strength of the potential is varied. Particular attention is paid to the behavior of the poles when the potential strength is such that there is a resonance close to a threshold. (Author)
AD-646 614 HC$3.00 MF$0.65

EFFECT OF THE MOTION OF THE NUCLEUS ON THE FINE AND HYPERFINE STRUCTURE OF TERMS.
American Meteorological Society, Boston, Mass.
For primary bibliographic entry see Field 7D.
AD-646 618 HC$3.00 MF$0.65

FINE STRUCTURE OF TERMS IN ATOMIC SPECIES OF CARBON AND NITROGEN TYPE IN THE CONFIGURATIONS 1s (2)2s2p (3) AND 1s (2)2s (2)2p (3).
American Meteorological Society, Boston, Mass.
For primary bibliographic entry see Field 7D.
AD-646 637 HC$3.00 MF$0.65

ENERGY LEVELS AND ISOTOPE SHIFTS OF TERMS FOR EXCITED STATES OF ATOMIC SPECIES OF HELIUM TYPE.
American Meteorological Society, Boston, Mass.
For primary bibliographic entry see Field 7D.
AD-646 674 HC$3.00 MF$0.65

QUANTUM MECHANICAL CALCULATION OF THE HELIUM MOLECULE.
American Meteorological Society, Boston, Mass.
For primary bibliographic entry see Field 7D.
AD-646 675 HC$3.00 MF$0.65

THE REALIZATION OF PARTICLE-LIKE SOLUTIONS OF THE EINSTEIN EQUATIONS FOR A SCALER COMPLEX FIELD,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
M. I. Stakvilevichus. 5 Dec 66, 12p FTD-HT-66-278
TT-67-60992
O Sushchestvokvanii Chastitsepodobnykh Reshenii Uravnenii Einshteina dlya Skalyarnogo Kompleksnogo Polya, unedited rough draft trans. of Moscow Univ. Vestnik. Seriya 3: Fizika, Astronomiya (USSR), v19 n6 p41-7 1964.

Descriptors: (*Field theory, *Differential equations), Tensor analysis, Matrix algebra, Relativity theory, Gravity, Elementary particles, Approximation (Mathematics), USSR.

It is shown that the Einstein equation with an energy-pulse tensor of a scaler complex field in the right half allow spherically symmetrical particle-like solutions, wherein the matrix has a Schwarzschild character at great distances. In the approximation of a weak gravitational field the course of the matrix approaches that of the corresponding matrix of the Newton potential. The possibility of obtaining the spectrum of the masses of scaler particles by the solution of precise equations and the introduction of a scaler quantized quasi-charge is indicated. (Author)
AD-646 931 HC$3.00 MF$0.65

THE ICECREAM-CONE SINGULARITY IN S-MATRIX THEORY,
Cambridge Univ. (England). Dept. of Applied Mathematics and Theoretical Physics.
P. V. Landshoff, D. I. Olive, and J. C. Polkinghorne. 9 Nov 65, 9p
AFOSR-67-0328
Grant AF-EOAR-79-63
Availability: Published in Journal of Mathematical Physics v7 n9 p1600-6 Sep 1966.

Descriptors: (*S-matrix, Diagrams), (*Decay schemes, S-matrix), Perturbation theory, Elementary particles, Pions, Nucleons, Antiparticles, Great Britain.
Identifiers: Singularity, Unitarity.

The icecream-cone singularity is analysed by S-Matrix theory methods. It is found to appear only in that part of the physical region predicted by finite-order perturbation theory. The corresponding discontinuity is derived, and the nature of the singularity is discussed. (Author)
AD-646 936 Not available from CFSTI.

NORMAL THRESHOLDS IN SUBENERGY VARIABLES,
Cambridge Univ. (England). Dept. of Applied Mathematics and Theoretical Physics.
P. V. Landshoff, D. I. Olive, and J. C. Polkinghorne. 9 Nov 65, 8p
AFOSR-67-0329
Grant AF-EOAR-79-63
Availability: Published in Journal of Mathematical Physics v7 n9 p1593-9 Sep 1966.

Descriptors: (*S-matrix, Diagrams), (*Decay schemes, S-matrix), Elementary particles, Energy, Complex variables, Integration, Great Britain.
Identifiers: Singularity, Unitarity.

The discontinuity across the normal threshold in a subenergy variable is evaluated by S-matrix methods. The effect on the discontinuity of continuing past higher Landau singularities is discussed. (Author)
AD-646 937 Not available from CFSTI.

LECTURES ON RELATIVITY THEORY.
Illinois Univ., Urbana. Coordinated Science Lab.
J. Ray. Aug 66, 161p NASA-CR-81281, R-311
Grant NSG-443, Contract DA-28-043-AMC-00073/E/

Descriptors: *Lorentz transformation, *Minkowski theory, *Relativity theory, *Tensor analysis, Analysis, Disturbance, Dynamics, Field, Gravitational, Kinematics, Mechanics, Newton, Periodic, Relativity, Tensor, Theory.

For abstract, see STAR 05 06.
N67-16519 HC$3.00 MF$0.65

20K. SOLID MECHANICS

STATIC AND DYNAMIC LOAD-DEFLECTION TESTS OF STEEL STRUCTURES.
Final rept., 15 Sep 63-1 Sep 64,
Illinois Univ., Urbana. Dept. of Civil Engineering.
F. L. Howland, W. Egger, R. J. Mayerjak, and R. J. Munz. 1 Sep 64, 253p Structural Research Ser-92
Contract AF 33 (616)-170

Descriptors: (*Beams (Electromagnetic), *Beams (Structural)), Structures, Blast, Steel, Physical properties, Mechanics.

The results of four phases of a study of the resistance of structural steel frames and frame components are describe in this report. Three of the phases, the study of full-scale beam-columns laterally loaded in a principal direction, the model frame study, and the study of obliquely loaded full-scale beam-columns, are concerned with the investigation of static resistance. The fourth phase is con-

cerned with the nature of dynamic resistance of beams. The purpose of this program is to obtain the structural parameters necessary to define the resistance of buildings and building components to blast loading. The static resistances, as measured in tests of the beam-columns and frames are compared with the resistances predicted using the elasto-plastic theory and an extension of this theory to include the effect of strain hardening. In all studies described the influence of constant axial loads is discussed and techniques for including this effect in the analysis are presented except for the case of the oblique loading study. (Author)
AD-59 193 HC$3.00

A NONSTATIONARY TEMPERATURE PROBLEM FOR A CYLINDRICAL SHELL REINFORCED BY A RING,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 20M.
AD-646 387 HC$3.00 MF$0.65

STRESS ANALYSIS OF TWO INTERSECTING CYLINDICAL SHELLS.
Quarterly progress rept.
General Technology Corp., Torrance, Calif.
10 Oct 66, 4p Rept. no. 24
Contract NObs-94173

Descriptors: (*Structural shells, Stresses), (*Cylindrical bodies, Stresses), Loading (Mechanics), Moments, Analysis, Deformation, Pressure.

Contents: Internal pressure case; Out-of-plane moment loading; In-plane moment loading.
AD-646 389 HC$3.00 MF$0.65

A VARIATIONAL PROBLEM IN THE THEORY OF PLASTICITY,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
G. P. Marukhno. 26 Jul 66, 17p FTD-MT-65-251 TT-67-60779
Edited machine trans. of Institut Inzhenerov Zheleznodorozhnogo Transporta, Leningrad. Sbornik (USSR), n190 p267-75 1962.

Descriptors: (*Plasticity, Theory), Continuum mechanics, Partial differential equations, Stresses, Strain (Mechanics), Deformation, USSR.

The work dwells on certain variational principles of the theory of plasticity of Hencky with the Von Mises condition of plasticity without hardening, and on their application. (Author)
AD-646 423 HC$3.00 MF$0.65

THE EQUATIONS OF BENDING OSCILLATIONS OF A CAVITY THAT IS PARTIALLY FILLED WITH FLUID,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
L. V. Dokuchaev. 16 Sep 66, 13p FTD-HT-66-471
TT-65-14435
Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika, n3 p149-53 1965.

Descriptors: (*Rods, Bending), (*Oscillation, Structural shells), Equations, Fluids, Conical bodies, Elasticity, USSR.

Equations are generalized for the case of a noncylindrical rod with a fluid partially filling a cavity of arbitrary configuration, and the coefficients of these equations are also determined for the case of a conic shell with a small apex angle. (Author)
AD-646 431 HC$3.00 MF$0.65

TRANSIENT ELASTIC WAVES IN INFINITE ANISOTROPIC PLATES: THE NEAR FIELD.
Technical rept.,
California Inst. of Tech., Padadena. Div. of Engineering and Applied Science.
R. A. Scott, and J. Miklowitz. Dec 66, 50p TR-4
Contract Nonr-220 (57)

Descriptors: (*Mechanical waves, Propagation), Elasticity, Equations of motion, Crystal structure, Anisotropy, Loading (Mechanics).

For certain classes of materials and orientations of the axes of symmetry, the equations of motion of alinear, anisotropic, elastic solid admit of plane-strain solutions. A problem is considered in which such motions are generated, namely, the application of an impulsive, normal, line load, parallel to one of the crystallographic axes, on one face of an infinite plate. It is found that two basic situations arise, depending on whether certain branch points are complex, or real and pure imaginary, and in the former case the solution on the epicentral axis is obtained. This solution is analyzed numerically for several anisotropic media, and isotropic media for comparison purposes. (Author)
AD-646 435 HC$3.00 MF$0.65

THERMAL STRESSES IN SHELLS OF ROTATION AT A NONAXIALLY-SYMMETRICAL TEMPERATURE FIELD,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
D. Kh. Krakovskii. 18 Aug 66, 15p FTD-TT-65-2044
TT-67-60788
Unedited rough draft trans. of Teplovye Napryazneniya v Elementakh Konstruktsii (USSR), n4 p113-21 1964.

Descriptors: (*Structural shells, Thermal stresses), Rotation, Temperature, USSR.

Equations are developed for the thermal stresses.
AD-646 450 HC$3.00 MF$0.65

ON THE USE OF THE RING TEST FOR DETERMINING RATE SENSITIVE MATERIAL CONSTANTS,
Catholic Univ. of America, Washington, D. C.
Nicholas Perrone. Nov 66, 22p Rept. no. 3
Grant NSF-GK-782

Descriptors: (*Mechanical properties, *Tests), (*Metals, Mechanical properties), Strain (Mechanics), Rings, Explosive materials, Stresses, Dynamics, Plasticity, Test methods, Materials.

An explosive ring test is reappraised in light of recently developed material behavior models and analytical predictive techniques. It is demonstrated in complete detail how this test may be utilized to determine the uniaxial flow laws of rate sensitive perfectly plastic and strain hardening materials. (Author)
AD-646 609 HC$3.00 MF$0.65

ENGINEERING CLASSIFICATION AND INDEX PROPERTIES FOR INTACT ROCK.
Illinois Univ., Urban. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8G.
AD-646 610 HC$3.00 MF$0.65

SOLUTION OF THE EQUATION OF MOTION FOR FORCED TRANSVERSE VIBRATION OF A SLENDER BEAM WITH VISCOUS DAMPING,
Picatinny Arsenal, Dover, N. J. Feltman Research Labs.
For primary bibliographic entry see Field 16D.
AD-646 633 HC$3.00 MF$0.65

FOREIGN SCIENCE BULLETIN VOL. 3, NO. 1, 1967.
Library of Congress, Washington, D. C. Aerospace Technology Div.
For primary bibliographic entry see Field 5A.
AD-646 634 HC$3.00 MF$0.65

DEVELOPMENT OF EQUIPMENT AND TECHNIQUES FOR COMPLEX FATIGUE LOADING.
Final technical rept.,
Aerojets, Inc., West Chester, Pa.
Herbert Kartluke, Philip G. Luckhardt, and Gary D. Pruder. Dec 66, 76p
USAAVLABS-TR-66-86
Contract DA-44-177-AMC-257 (T)

Descriptors: (*Fatigue (Mechanics), Test equipment), (*Loading (Mechanics), Test equipment), Vibration, Resonance, Steel, Aluminum alloys, Titanium alloys, Joints, Performance (Engineering), Feasibility studies, Instrumentation, Hysteresis, Failure (Mechanics).

Fatigue testing apparatus for simultaneous application of high-frequency, low-frequency, and static loading was designed and constructed. The equipment provided for the introduction of high-frequency vibratory energy at 15,000 cycles per second at one end of a specimen, and static loading and low-frequency vibration at 2000 cycles per minute at the opposite end. Specimens with a necked-down test section were designed for reasonance at the high frequency, and the specimen holding arrangement insured effective delivery of the high-frequency energy into the specimen. The feasibility of the apparatus as a fatigue test instrument was demonstrated in limited tests on integral specimens of 4340 steel, 2014-T6 aluminum alloy, and 6Al-4V titanium alloy, and on joint specimens of 4340 steel involving fusion-welded, riveted, adhesive-bonded, and brazed joints. With constant low-frequency and static loads, the specimens generally demonstrated shorter elapsed time to failure as the high-frequency power input was increased. The titanium alloy, however, appeared to be insensitive to the high-frequency vibration at the power levels used, possibly because of its internal hysteresis characteristics. The equipment provides a means for laboratory testing of materials and joint designs for knowledge of materials behavior under conditions encountered in rocket-propelled vehicles. It was recommended that comprehensive fatigue testing be carried out with this apparatus and that methodology be evolved for evaluation and use of the test data.
AD-646 647 HC$3.00 MF$0.65

A BEND METHOD FOR MEASURING FATIGUE CRACK PROPAGATION IN THICK MATERIALS.
Technical rept.,
Royal Aircraft Establishment, Farnborough (England).
S. Pearson. Jun 66, 15p TR-66204

Descriptors: (*Crack propagation, Test methods), Fatigue (Mechanics), Thickness, Bending, Materials, Aluminum alloys, Great Britain, Measurement, Test equipment, Steel.

A fatigue machine is described for making crack propagation experiments in bending, on specimens up to half inch thick. The test specimen is small and of simple shape to minimise machining time and cost. The machine can be readily adapted to make tests at high temperatures and to run at different frequencies. For two aluminium alloys comparison experiments on specimens cut from the same sheet of material gave good agreement for tests made in tension or in bending. (Author)
AD-646 649 HC$3.00 MF$0.65

A METHOD OF ANALYZING PROPELLER-EXCITED VIBRATORY FORCES ON A MODEL.
David Taylor Model Basin, Washington, D. C. Hydromechanics Lab.
For primary bibliographic entry see Field 13J.
AD-646 678 HC$3.00 MF$0.65

THE EFFECT OF COUPLE-STRESSES ON SINGULARITIES DUE TO DISCONTINUOUS LOADINGS.
Technical rept.,
California Inst. of Tech., Pasadena. Div. of Engineering and Applied Science.
D. B. Bogy, and Eli Sternberg. Dec 66, 28p TR-9
Contract Nonr-220 (58)

Descriptors: (*Stresses, Complex variables), Elasticity, Solids, Theory, Loading (Mechanics), Functions.

The singularities induced by discontinuous normal or shearing tractions applied to a semi-infinite solid are examined within the two-dimensional linearized couple-stress theory of elastic behavior and are compared with their counterpart in the classical theory of plane strain. A finite jump in the shear loading is found to produce a logarithmic infinity at the load discontinuity in the normal stress acting parallel to the boundary according to both theories. In contrast, a finite jump in the normal loading, according to the couple -stress theory, gives rise to a logarithmic infinity at the load discontinuity in the shear stress at right angles to the boundary, although all stresses remain bounded in the corresponding classical solution; whereas the conventional theory for this loading case predicts a logarithmic singularity in tthe rotation field, the latter remains bounded in the modified solution. (Author)
AD-646 680 HC$3.00 MF$0.65

ON THE FOUNDATIONS OF THE THEORY OF ELASTIC SHELLS.
Massachusetts Inst. of Tech., Cambridge.
E. Reissner. 1964, 12p
Proceedings of Int. Conf. Congress of Applied Mechanics, Munich (West Germany) 1964. Research supported in part by NSF and ONR.
Availability: Published in Applied Mechanics p20-30 1964.

Descriptors: (*Elastic shells, Theory), Differential equations, Stresses, Deformation, Boundary value problems, Strain (Mechanics), Problem solving, Transformations (Mathematics).

The foundation problem of the theory of thin elastic shells is the formulation of a two-dimensional system of differential equations and boundary conditions for a rational approximate determination of stresses and deformations in three-dimensional elastic bodies of the form of a (thin) elastic layer surrounding a surface in space, the middle surface of the shell. It is possible to require that all statements of the two-dimensional theory to be established are deductions from a three-dimensional formulation of a relevant boundary value problem. It is equally well possible to establish a considerable part of two-dimensional shell theory in an equivalent fashion without reference to any three-dimensional formulation, and beyond this replace those aspects of shell theory which require consideration of the three-dimensional formulation by independent two-dimensional ad hoc considerations which, hopefully, lead to the same or nearly the same results as the deductive steps from three- to two-dimensions. The present account attempts to describe the nature of the questions which are encountered and recent progress which, it is believed, represents the effective solution of the problem of deriving two-dimensional theory from three-dimensional theory. It is possible to discuss these questions within the framework of linear theory and in terms or orthogonal lines of curvature coordinates, and this is done in the following.
AD-646 691 Not available from CFSTI.

INFLUENCE COEFFICIENTS FOR SEMI-INFINITE AND INFINITE CIRCULAR CYLINDRICAL ELASTIC SHELLS.
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 13M.
AD-646 693 Not available from CFSTI.

STABILITY OF CYLINDRICAL SHELLS UNDER MOVING LOADS BY THE DIRECT METHOD OF LIAPUNOV.
Technical rept.,
California Univ., San Diego, La Jolla. Dept. of the Aerospace and Mechanical Engineering Sciences.
G. A. Hegemier. Jan 67, 34p TR-5
Contract N00014-67-A-0109-0003, Grant NsG-18-59

Descriptors: (*Cylindrical bodies, Stability), (*Structural shells, Stability), Loading (Mechanics), Motion, Elastic shells, Boundary layer transition.
Identifiers: Lyapunov method.

The stability of a long, thin, elastic circular cylindrical shell subjected to axial compression and an axisymmetric load moving with constant velocity along the shell axis is studied. With the aid of the direct method of Liapunov, and employing a nonlinear Donnell-type shell theory, sufficient conditions for local stability of the axisymmetric response are established in a functional space whose metric is defined in an average sense. Numerical results, which are presented for the case of a moving decayed step load, reveal that the sufficient conditions for stability developed here and the sufficient conditions for instability obtained in a previous paper lead to the actual stability transition boundary. (Author)
AD-646 709 HC$3.00 MF$0.65

WAVE FORCES ON CIRCULAR CYLINDRICAL PILES USED IN COASTAL STRUCTURES.
California Univ., Berkeley. Hydraulic Engineering Lab.
For primary bibliographic entry see Field 13M.
AD-646 741 HC$3.00 MF$0.65

THERMAL STRESSES IN A SEMI-INFINITE SOLID BY A FINITE DIFFERENCE TECHNIQUE.
Naval Applied Science Lab., Brooklyn, N. Y.
For primary bibliographic entry see Field 19D.
AD-646 862 HC$3.00 MF$0.65

2929MC - STRENGTH OF STRUCTURAL CERAMICS UNDER IMPACT LOADING.
Ohio State Univ., Research Foundation, Columbus.
For primary bibliographic entry see Field 11B.
AD-646 879 HC$3.00 MF$0.65

ELASTIC PLASTIC TORSION AS A PROBLEM IN NON-LINEAR PROGRAMMING.
Illinois Inst. of Tech., Chicago. Dept. of Mechanics.
Philip G. Hodge, Jr. Jan 67, 28p DOMIIT-1-33
Contract Nonr-1406 (04)

Descriptors: (*Rods, Stresses), (*Nonlinear programming, *Torsion), Elasticity, Plasticity, Approximation (Mathematics), Prismatic bodies.

For a simply connected region, it is shown that the problem of determining the elastic-plastic stress function is equivalent to that of minimizing the complementary energy subject to the inequality constraints required by the yield condition. A method is proposed for approximating this minimum in which the cross section is approximated by a finite number of triangles and a linear stress function is assumed for each triangle. This approximate problem is then solved by means of a recently available computer program for solving nonlinear constrained minimization problems. (Author)
AD-646 888 HC$3.00 MF$0.65

SMALL MOTIONS SUPERPOSED ON LARGE STATIC DEFORMATIONS IN POROUS MEDIA.
Technical rept.,
California Univ., Berkeley. Div. of Applied Mechanics.
M. J. Crochet, and P. M. Naghdi. Oct 66, 48p
AM-66-18
Contract Nonr-222 (69)

Descriptors: (*Liquids, *Equations of motion), (*Porous materials, *Deformation), Elasticity, Fluid flow, Statics, Stresses.

The paper is concerned with the development of the field equations and constitutive equations for small motions superposed on large static deformation of a liquid-filled porous elastic solid, using a basic theory of interacting continua. Two examples of parallel flow in a medium which initially is subjected to a homogeneous deformation is discussed. Also a representation for the solutions of the equations of the infinitesimal theory (analogous to the Boussinesq-Papkovitch representation) is deduced for a class of steady flow. (Author)
AD-646 910 HC$3.00 MF$0.65

CONTROLLABLE DEFORMATIONS OF INCOMPRESSIBLE SIMPLE MATERIALS.
Technical rept.,
California Univ., Berkeley. Div. of Applied Mechanics.
M. M. Carroll. Oct 66, 25p AM-66-17
Contract Nonr-222 (69)

Descriptors: (*Deformation, Control), (*Materials, Deformation), Elasticity, Compressive properties, Equations of motion, Stresses, Cylindrical bodies, Mechanical properties, Bending.

At present, five families of inhomogeneous deformations are known to be controllable for homogeneous, isotropic, incompressible elastic materials, i.e., to be possible deformations in any such material in the absence of body forces. It is shown that these five families of deformations are controllable also for homogeneous, isotropic, incompressible simple materials. (Author)
AD-646 917 HC$3.00 MF$0.65

TEMPERATURE STRESSES IN A THIN ELASTIC PLATE WITH THE PRESENCE OF A SOURCE OF HEAT ON THE CONTOUR OF THE PLATE.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
V. R. Kulbakh. 7 Dec 66, 19p FTD-HT-66-367
TT-60990
Temperaturnye Napryazheniya v Tonkoi Uprugoi Plastine pri Nalichii Istochnika Tepla na Konture Plastiny, unedited rough draft trans. of Politekhnicheskii Institut, Tallinn. Trudy (Estonian SSR), ser A n200 p49-61 1963.

Descriptors: (*Metal plates, Thermal stresses), (*Structural parts, *Thermal stresses), Heat, Distribution, Elasticity, Sources, Deformation, USSR.
Identifiers: Plates (Mechanical).

The stressed state of a thin rectangular plate whose contour is acted upon by a heat source is considered. The relative temperature problem is solved and the temperature stresses are determined. The solutions obtained are analyzed and as an example of determining the temperature stresses is examined. (Author)
AD-646 928 HC$3.00 MF$0.65

DYNAMICS AND STRENGTH OF SHELLS.
Israel Program for Scientific Translations, Ltd., Jerusalem.
P. M. Ogibalov. 1966, 321p NASA-TT-F-284, TT-65-50118

Transl. Into English Of The Book "voprosy Dinamiki I Ustoichivosti Obolochek" Moscow, Izd. Moskovskogo Univ., 1963 Published For Nasa And Nsf

Descriptors: *Elastic deformation, *Panel flutter, *Shell stability, Deformation, Elastic, Equation, Flutter, Heat, Motion, Panel, Propagation, Radiation, Shell, Stability, Strain, Stress, Vibration, Wave.

For abstract, see STAR 05 06.
N67-15428 HC$3.00 MF$0.65

THE VIBRATION BEHAVIOR OF CIRCULAR CONICAL SHELLS.
National Aeronautics and Space Administration, Washington, D. C.
Z.-YU. Hong, and C.-T. Tang. Nov 66, 25p
NASA-TT-F-10393
Transl. Into English From Acta Mechanica Sinica (Communist China), V. 9, No. 1, Mar. 1966 P 14-26

Descriptors: *Circular shell, *Conical shell, *Vibration mode, Application, Calculation, Circular, Conical, Decomposition, Dimension, Eigenfrequency, Engineering, Function, Geometry, Mode, Shell, Vibration, Wave.

For abstract, see STAR 05 06.
N67-15556 HC$3.00 MF$0.65

PLASTIC BUCKLING OF AXIALLY COMPRESSED ECCENTRICALLY STIFFENED CYLINDERS.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
R. M. Jones. Jan 67, 24p NASA-TN-D-3769
Contract 124-11-06-04-23

Descriptors: *Axial compression, *Cylindrical shell, *Elastic buckling, *Plastic deformation, *Stiff structure, Aerospace, Axial, Buckling, Compression, Cylinder, Deformation, Differential, Distribution, Eccentricity, Elastic, Equation, Geometry, Plastic, Shell, Stability, Stiffness, Strain, Stress, Structure, Theory.

For abstract, see STAR 05 06.
N67-15662 HC$3.00 MF$0.65

ON THE DUALITY BETWEEN THE PROBLEMS OF STRETCHING AND OF BENDING OF PLATES, 16 MARCH - 15 SEPTEMBER 1966.
Massachusetts Inst. of Tech., Cambridge.
Z. M. Elias. Jan 67, 58p NASA-CR-705
Contract NGR-22-009-059

Descriptors: *Bending, *Plate theory, *Shell theory, *Stretch forming, Airys stress function, Anisotropy, Boundary, Curvature, Displacement, Dual, Force, Forming, Geometry, Orthotropism, Plane, Plate, Shear, Shell, Strain, Stress, Stretch, Stretching, Symmetry, Theory, Transverse.

For abstract, see STAR 05 06.
N67-15671 HC$3.00 MF$0.65

THEORY OF THE THREE-DIMENSIONAL STRESS STATE IN A PLATE WITH A HOLE.
Theorie Van De Driedimensionale Spanningstoestand In Een Doorboorde Plaat
National Aeronautics and Space Administration, Washington, D. C.
J. B. Alblas. Jan 67, 98p NASA-TT-F-10451
Transl. Into English Of A Thesis Submitted To The Tech. High School, Delft, Netherlands, 3 Jul. 1957 P 1-127

Descriptors: *Elastic plate, *Perforated plate, *Plate theory, *Stress distribution, Analysis, Circular, Complex, Dimensional, Distribution, Eigenfunction, Elastic, Hole, Infinite, Perforation, Plate, State, Stress, Theory, Three.

For abstract, see STAR 05 06.
N67-15692 HC$3.00 MF$0.65

DEVELOPMENT AND APPLICATION OF A PHOTOELASTO- PLASTIC METHOD TO STUDY STRESS DISTRIBUTIONS IN VICINITY OF A SIMULATED CRACK.
Lockheed Aircraft Corp., Sunnyvale, Calif.
A. R. Hunter, and M. E. Schwarz. Dec 66, 142p
NASA-CR-655
Contract NAS1-4760

Descriptors: *Crack, *Photoelastic stress measurement, *Plastic material, *Stress-strain distribution, Alloy, Aluminum, Birefringence, Calibration, Cycle, Distribution, Epoxy, Freeze, Infinite, Material, Measurement, Model, Photoelasticity, Plastic, Plate, Polycarbonate, Polymer, Resin, Simulation, Stress, Stress-strain, Thermal, Thickness, Thin, Tip.

For abstract, see STAR 05 06.
N67-16663 HC$3.00 MF$0.65

MULTIVARIABLE ANALYSIS OF THE MECHANICS OF PENETRATION OF HIGH SPEED PARTICLES.
Martin Co., Denver, Colo.
D. D. Bouma, and W. C. Burkitt. Dec 66, 184p
NASA-CR-664
Contract NAS7-219

Descriptors: *Metal particle, *Penetration ballistics, *Projectile penetration, *Statistical analysis, *Target penetration, Analysis, Ballistics, Bumper, Crater, Depth, Geometry, High speed, Hypervelocity, Impact, Mechanical, Metal, Particle, Penetration, Physical, Prediction, Projectile, Property, Statistics, Target, Theory, Velocity, Volume.

For abstract, see STAR 05 06.
N67-16664 HC$3.00 MF$0.65

ON THE DYNAMIC CHARACTERISTICS OF A VARIABLE- MASS SLENDER ELASTIC BODY UNDER HIGH ACCELERATIONS.
Arizona State Univ., Tempe.
L. Meirovitch, and D. A. Wesley. Feb 67, 83p
NASA-CR-713
Contract NGR-03-001-022

Descriptors: *Differential equation, *Dynamics, *Elastic body, *Motion equation, *Slender body, Body, Closed, Differential, Elastic, Equation, Flow, Fluid, Form, Formulation, High acceleration, Internal, Mathematics, Motion, Numerical, Planar, Slender, Solution.

For abstract, see STAR 05 06.
N67-16672 HC$3.00 MF$0.65

COMPRESSION TESTS OF OPEN-FACE TRUSS-CORE SANDWICH PANELS.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
G. W. Zender. Jan 67, 23p NASA-TN-D-3780
Contract 124-08-03-03-23

Descriptors: *Compression buckling, *Core, *Sandwich construction, *Truss, Buckling, Compression, Construction, Orthotropism, Plate, Rib, Sandwich, Stiffness, Stress.

For abstract, see STAR 05 06.
N67-16688 HC$3.00 MF$0.65

VIBRATION ANALYSIS OF CYLINDRICALLY CURVED PANELS WITH SIMPLY SUPPORTED OR CLAMPED EDGES AND COMPARISON WITH SOME EXPERIMENTS.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
J. L. Sewall. Jan 67, 54p NASA-TN-D-3791
Contract 124-08-05-02-23

Descriptors: *Curved panel, *Structural material, *Vibrational frequency, Aerospace, Clamp, Curve, Cylinder, Edge, Frequency, Material, Panel, Structural, Vehicle, Vibration.

For abstract, see STAR 05 06.
N67-16689 HC$3.00 MF$0.65

THE EXPLORATION OF FACTORS DETERMINING THE FATIGUE STRENGTH OF COMPOSITE BEAMS WITH A REDUCED NUMBER OF SHEAR CONNECTORS IN HIGHWAY BRIDGES.
North Carolina State Univ., Raleigh. Dept. of Engineering Research.
For primary bibliographic entry see Field 13M.
PB-174 006 HC$3.00 MF$0.65

PRESTRESSED CONCRETE DURABILITY AND CORROSION,
Montana State Univ., Bozeman. Engineering Research Labs.
For primary bibliographic entry see Field 11B.
PB-174 007 HC$3.00 MF$0.65

THE BEHAVIOR OF THIN-WEB PLATE GIRDERS UNDER REPEATED LOADING.
Lehigh Univ., Bethlehem, Pa. Fritz Engineering Lab.
For primary bibliographic entry see Field 13M.
PB-174 019 HC$3.00 MF$0.65

20L. SOLID STATE PHYSICS

PHOTOCONDUCTIVITY AND NOISE IN TELLURIUM,
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
Vincent A. Vis. Aug 63, 87p Rept. no. 2900-382-T
Contract DA-36-039-sc-78801
Rept. of Proj. MICHIGAN.

Descriptors: (*Tellurium, Photoconductivity), Noise, Single crystals, Temperature, Optical phenomena, Optics, Excitation, Electrical conductance, Transients, Valence, Resistance (Electrical).
Identifiers: Michigan Project.

Certain electrical properties of single-crystal tellurium in the extrinsic temperature range have been measured and interpreted theoretically. The chief object of study was the effect of thermal and optical excitation upon electrical conductivity in its steady-state, transient, and randomly fluctuating aspects. The steady-state photoconductivity response is proportional to the first power of the intensity of the light for low excitation, becoming proportional to the square root of the intensity for conductance changes >2%. The small-signal responsive time constant is approx. 350 microsec for T < 80 degrees K in the dark, decreasing rapidly with either thermal or (steady) optical excitation. A model composed of 0.5x 10 to 13th power traps/cc of energy level 0.072 ev above the valence band and an unspecified recombination mechanism account quantitatively for the observed steady-state and transient behavior. The electrical noise power due to conductivity fluctuations is measured in the dark as a function of temperature and at 79 degrees K as a function of steady optical excitation. The dark noise is interpreted quantitatively in terms of electron transitions between the valence band and traps of energy level approx. 0.045 ev above it. The additional noise due to steady optical excitation at 79 degrees K is attributed to transverse carrier-density gradients resulting from nonuniform excitation. (Author)
AD-417 657 HC$3.00

MAGNETIC FIELD DEPENDENCE OF THE KNIGHT SHIFT.
Revised ed.,
Battelle Memorial Inst., Columbus, Ohio. Columbus Labs.
M. L. Glasser. 23 Jun 66, 11p Bat-Pub-5655
AFOSR-67-0085
Grant AF-AFOSR-260-66
Revision of manuscript submitted 15 Apr 66.
Availability: Published in Physical Review v150 n1 p234-42 Oct 7 1966.

Descriptors: (*Nuclear magnetic resonance, Magnetic fields), Hyperfine structure, Interactions, Magnetic properties, Electrons, Band theory of solids, Metals, Wave functions, Atomic orbitals.
Identifiers: Knight shift.

The apparent inconsistencies among the theories of de Haas-van Alphen oscillations in the Knight shift due to Das and Sondheimer, to Stephen, and to Dolgopolov and Bystrik are resolved. The calculation of the Knight shift is treated by a method which goes beyond the semiclassical approximation used by these authors. It is found that for polyvalent metals the dominant magnetic field dependence may be due to the behavior of the electronic wave function, rather than to the density of states. (Author)
AD-646 396 Not available from CFSTI.

PROTON AND CHLORINE NUCLEAR MAGNETIC RESONANCE IN ANTIFERROMAGNETIC MnCl2.4H2O,
Michigan State Univ., East Lansing. Dept. of Physics.
R. S. Spence, and V. Nagarjan. 31 Apr 66, 10p
AFOSR-66-2840
Grant AF-AFOSR-430-63
Availability: Published in Physical Review v149 n1 p191-8 Sep 9 1966.

Descriptors: (*Antiferromagnetism, *Nuclear magnetic resonance), (*Manganese compounds, Nuclear magnetic resonance), Nuclear spins, Chlorides, X-ray diffraction analysis, Neutron diffraction analysis, Symmetry (Crystallography), Magnetic fields, Protons, Chlorine, Hyperfine structure.
Identifiers: Manganous chloride.

The magnetic structure of the antiferromagnetic phase of MnCl2.4H2O was examined using proton and chlorine NMR. By combining observations on the symmetry and number of proton internal magnetic fields with x-ray and neutron-diffraction data, one is led to three possible magnetic structures. However, only one of these (Psub1/a') predicts fields at the proton sites whose orientation and magniture is in reasonable agreement with the experimentally observed fields. The chlorine resonance data corroborate the proton proton-resonance results and provide information on the transferred hyperfine interaction. (Author)
AD-646 399 Not available from CFSTI.

ANOMALY IS SPIN-WAVE SPECTRUM OF MAGNETIC METALS.
Yeshiva Univ., New York. Belfer Graduate School of Science.
For primary bibliographic entry see Field 20C.
AD-646 408 Not available from CFSTI.

PARAMAGNETIC RESONANCE OF Cu (++):MgO AT 1.2K.
Interim rept.,
Minnesota Univ., Minneapolis. Dept. of Chemistry.
R. E. Coffman. 3 May 66, 5p
AFOSR-67-0052
Grant AF-AFOSR-200-66
Prepared in cooperation with Augsburg Coll.
Availability: Published in Physics Letters v21 n4 p381-3 Jun 1 1966.

Descriptors: (*Paramagnetic resonance, *Copper), (*Magnesium oxides, Paramagnetic resonance), Anisotropy, Symmetry (Crystallography), Distortion, Predictions, Tunneling (Electronics), Atomic energy levels, Microwave spectroscopy, Solid solutions.
Identifiers: John-Teller effect.

The properties of an additional electron spin resonance spectrum of divalent copper in magnesium oxide single crystals at 1.2 degrees K is in agreement with theoretical predictions for a system with one ion per unit cell and exhibiting inversion resonance. These properties include line shape, increase in magnitude of the two spectra supports the concept of a Kramers quartet ground state. (Author)
AD-646 412 Not available from CFSTI.

HOLE TRAPPING AND THE IONIZATION ENERGY OF NATIVE ACCEPTOR CENTERS IN AgBr,
University of Southern California, Los Angeles, Dept. of Materials Science.
F. A. Kroger. 28 Feb 66, 6p
AFOSR-67-0011
Grant AF-AFOSR-986-66
Availability: Published in J Phys Chem Solids v27 p1697-9 1966.

Descriptors: (*Crystal lattice defects, *Silver compounds), (*Carriers (Semiconductors), Silver compounds), Bromides, Hall effect, Impurities, Color centers, Electrical properties.
Identifiers: Silver bromide.

Comparison of the Hall mobility and the drift mobility of holes measured under stationary conditions shows that at T > 200C holes are trapped at silver ion vacancies, the trapping energy being Ea = 0.18 e V. The effective mass ratio for the holes mh*/m = 0.6 - 0.9. At T < 200C trapping takes place either at silver ion vacancies at dislocations, or at iron impurities, leading to a center consisting of trivalent iron and a silver ion vacancy. (Author)
AD-646 413 Not available from CFSTI.

COMPETITIVE TRAPPING IN SODIUM DISILICATE GLASSES DOPED WITH Eu (+3).
Revised ed.,
Mellon Inst., Pittsburgh, Pa.
J. H. Mackey, H. L. Smith, and J. Nahum. 18 Apr 66, 13p
AFOSR-67-0012
Grant AF-AFOSR-974-66
Revision of manuscript submitted 14 Feb 66.
Availability: Published in J. Phys. Chem. Solids v27 p1773-82 1966.

Descriptors: (*Glass, *Color centers), (*Europium, *Carriers (Semiconductors)), Radiation damage, Impurities, Crystal lattice defects, Electrons, Band theory of solids, Band spectrum, Luminescence, Emissivity.

Optical processes in X-irradiated sodium disilicate glasses with additions of Eu (+3) up to 1% were studied. The added europium was assumed to have an electron trapping cross section proportional to its concentration and to compete with native defects for electrons generated by the X-rays; thus, the 'free' electron concentration is suppressed by Eu (+3). By considering these effects for small X-rays doses, it was possible to demonstrate that (1) an absorption band growing at 343 millimicrons was indicative of the photoreduction of europium; (2) a composite absorption band (E1,2 (-) band) peaked in the red or orange and another band peaked at 305 millimicrons (E3 (-) band) were the absorptions of trapped electrons; and (3) that two other bands peaked at 460 millimicrons (H2 (+)) and 620 millimicrons (H3 (+)) were absorption bands of trapped holes. Finally, the results show that luminescent processes involving a characteristic violet emission of silicate glasses should be interpreted as resulting from the recombination of a 'free electron' at the site of a trapped hole (H1 (+) center). (Author)
AD-646 433 Not available from CFSTI.

MILLIMETER ELECTRON PARAMAGNETIC RESONANCE IN STRONTIUM TITANATE.
Technical rept.,
Syracuse Univ., N. Y. Dept. of Physics.
Ralph Baer, and Gunter Wessel. 15 Jan 67, 95p
TR-4
Contract Nonr-669 (18)

Descriptors: (*Strontium compounds, *Paramagnetic resonance), (*Titanates, Paramagnetic resonance), Microwave spectroscopy, Millimeter waves, Impurities, Iron, Crystal lattice defects, Hamiltonian, Crystal structure, Heat treatment, Valence, Line spectrum, Intensity, Masers, Materials.
Identifiers: Strontium titanate.

The axial electron spin resonance spectrum of Fe (3+) doped SrTiO3 was investigated at room temperature at frequencies of 35.01, 65.09, 69.4 and 75 GHz. The magnetic field was variable from 0 to 25 K-gauss. A value of /2D/=81.2 plus or minus .14 GHz was found for the zero field splitting. An upper limit on the higher order zero field splitting terms a and F was found to be 0.5 GHz. The Hamiltonian was diagonalized using the above value of /2D/ on a computer, and the energy levels thus obtained were found to agree well with the experiment. The maximum transition probabilities were also calculated. The ratio of the intensities of the central cubic line and the axial -1/2 to +1/2 line was measured at an angle of 0 degrees. The results are in general agreement with the hypothesis that the axial spectrum is caused by local charge compensation. The crystal was subjected to a heat treatment by the National Lead Company. This heating is thought to either change Fe (2+) to Fe (3+) or Fe (2+) to Fe (4+) in the SrTiO3. Intensity measurements seem to indicate that the latter probably is more correct. (Author)
AD-646 439 HC$3.00 MF$0.65

AN INVESTIGATION OF THE INTERFACE STATES OF THE GERMANIUM-SILICON ALLOYED HETEROJUNCTION.
Final rept.,
Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
A. L. Reenstra, and H. W. Thompson, Jr. Jan 67, 111p TR-EE66-24
Contract N00016-66-C-0076-A04

Descriptors: (*Semiconductors, Interfaces), Germanium, Silicon, Dislocations, Impurities, Electrical properties, Alloys, Diffusion.

The alloyed germanium-silicon heterojunction interface is studied to more conclusively determine if interface states exist due to dislocations, or if an impurity contamination exists at the interface. A profile of the mixing of he the silicon and germanium is determined for the alloyed heterojunction by employing an electron microprobe for a spectrochemical analysis. The mixing is shown to be diffusion controlled. In n-n type heterojunctions, a p-type layer is observed to form at the interface. Hall coefficient, conductivity and capacitance measurements are made on this p-layer using the p-n junctions to the bulk regions for isolation. From the electrical measurements and the electron-microprobe analysis, there is very strong evidence to show the interface states to be caused by dislocations. These measurements rule out the two sources of impurities as a cause of the interface states and show direct evidence of dislocations causing the interface states. It can therefore be concluded that the source of interface states

in the alloyed germanium-silicon heterojunction is dislocations rather than impurities. (Author)
AD-646 445 HC$3.00 MF$0.65

POLISH TRANSACTIONS IN PHYSICS, VOL. 26, NO. 3 AND 4, 1964: SELECTED ARTICLES,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
P. P. Feofilov, and J. Kubatova. 20 Sep 66, 30p
FTD-TT-65-1832
TT-67-60790
Edited trans. of Acta Physica Polonica, v26 n3 p331-43; n4 p683-8 1964.

Descriptors: (*Rare earth elements, *Luminescence), (*Zinc sulfides, *Electroluminescence), Single crystals, Phosphorescent materials, Color centers, Excitation, Calcium fluorides, Band theory of solids, Solid solutions, Copper, Brightness, Carriers (Semiconductors), USSR, Czechoslovakia.

Contents: Luminescence of tri- and divalent ions of the rare earths in fluorite type crystals, by P. P. Feofilov; On the mechanism of electroluminescence in ZnS-Cu single crystals, by J. Kubatova.
AD-646 452 HC$3.00 MF$0.65

HIGH PRESSURE SYNTHESIS OF ARSENOPYRITE-TYPE TERNARY COMPOUNDS,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
For primary bibliographic entry see Field 7B.
AD-646 477 Not available from CFSTI.

MAGNETO-ACOUSTIC EFFECTS IN n-InSb AT 9 GHz. VOLUME XIX-2,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
K. W. Nill, and A. L. McWhorter. 1966, 5p
Prepared in cooperation with MIT, Cambridge, Electrical Engineering Dept. Research supported in part by USAF. Proceedings of International Conference on Physics of Semiconductors, Kyoto, 1966.
Availability: Published in Journal of the Physical Society of Japan v21 Suppl. I p755-9 1966.

Descriptors: (*Indium antimonides, *Ultrasonic radiation), Cryogenics, Magnetic fields, Magnetic properties, Semiconductors, Wave transmission, Propagation, Attenuation, Velocity.

The propagation of 9GHz longitudinal ultrasonic waves was studied in n-InSb at temperatures between 4.2K and 50K and in magnetic fields up to 25 kG for several crystal orientations and electron concentrations, with particular emphasis on the electronic contribution to the attenuation and velocity of the ultrasonic wave. These measurements have yielded a value of 0.06 plus or minus 0.005 C/sq m for the magnitude of the piezoelectric constant e14 and 4.5 plus or minus 0.5 eV for the magnitude of the conduction band deformation potential C sub l for InSb. The experiments also verify several aspects of the theory of ultrasonic propagation in semiconductors for ql>1. (Author)
AD-646 478 Not available from CFSTI.

MAGNETO-PIEZO-OPTICAL EXPERIMENTS IN SEMICONDUCTORS,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
J. G. Mavroides, M. S. Dresselhaus, R. L. Aggarwal, and G. F. Dresselhaus. 1966, 6p
Research supported in part by AFOSR. Proceedings of International Conference on Physics of Semiconductors, Kyoto 1966.
Availability: Published in Journal of Physical Society of Japan v21 Suppl. 1966.

Descriptors: (*Semiconductors, *Band theory of solids), Germanium, Indium antimonides, Magneto-optic effect, Piezoelectric effect, Photons, Magnetic fields.

Preliminary room temperature results are reported of magneto-piezo-reflection experiments in germanium and InSb. It is demonstrated that acoustical modulation of the magneto-reflection enhances the optical structures which are identified with interband transitions. By extrapolation of the magneto-piezo-reflection results to zero magnetic field, the resonance frequency within the piezo-reflection linewidth is determined. In germanium, results are reported for interband transitions across the indirect bandgap and the lowest direct bandgap; and also between the spin-orbit split-off valence band and the k=0 conduction band. In InSb, results are presented for interband transitions across the lowest bandgap. (Author)
AD-646 479 Not available from CFSTI.

OSCILLATORY MAGNETO-ABSORPTION OF THE DIRECT TRANSITION IN THE LAYER COMPOUND GALLIUM SELENIDE AT 1.5 K. VOLUME III,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
J. Halpern. 1966, 5p
Proceedings of International Conference on Physics of Semiconductors, Kyoto, 1966.
Availability: Published in Journal of the Physical Society of Japan v21 p180-3 1966.

Descriptors: (*Gallium alloys, Selenium alloys), (*Semiconductors, Cryogenics), Experimental data, Band theory of solids, Absorption spectrum, Excitons.
Identifiers: Gallium selenides.

Experimental results are presented for the interband magneto-absorption of GaSe in the Landau region and in the vicinity of the direct exciton in both the Faraday and Voigt geometries to fields of 103 kG. Making use of Landau magneto-oscillations, linear Zeeman splittings and diamagnetic shifts we have obtained values for various combinations of masses and g-factors in both the longitudinal and transverse directions as well as for the exciton energies. Interpretations of the data in terms of the band structure are given. (Author)
AD-646 483 Not available from CFSTI.

POLARON INDUCED ANOMALIES IN InSb,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
D. M. Larsen, and E. J. Johnson. 1966, 5p
Proceedings of International Conference on Physics of Semiconductors, Kyoto, 1966.
Availability: Published in Journal of the Physical Society of Japan v21 p443-7 1966.

Descriptors: (*Indium antimonides, *Band theory of solids), Anomalies, Electrons, Polarization, Absorption spectrum.
Identifiers: Polarons.

Striking anomalies were found in the interband magneto-absorption of InSb which constitute an unambiguous observation of polaron self energy effects. Examining the magnetic field dependence of the infrared absorption associated with interband transitions to the n=1 conduction band Landau levels. The photon energy at the absorption maxima and absorption intensity was found to behave in a manner quite different from that expected on the basis of a rigid lattice model. Theoretically, polaron effects are expected to be strongly enhanced when the cyclotron energy approaches the energy of a LO phonon. Analysis indicates that enhanced polaron effects are responsible for the observed anomalies. (Author)
AD-646 484 Not available from CFSTI.

SULFUR DONORS IN SILICON: INFRARED TRANSITIONS AND EFFECTS OF CALIBRATED UNIAXIAL STRESS,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
W. E. Krag, W. H. Kleiner, H. J. Zeiger, and S. Fischler. 1966, 4p
Supported by U. S. Air Force.
Availability: Published in Journal of the Physical Society of Japan v21 p230-3 1966.

Descriptors: (*Semiconductors, Optical properties), (*Silicon, *Color centers), (*Sulfur, Color centers), Impurities, Solid solutions, Atomic energy levels, Spectra (Infrared), Electron transitions, Absorption spectrum, Stresses, Band spectrum, Symmetry (Crystallography).

Four distinct types of impurity centers were found arising from sulfur in silicon. For each of the four types there is a series of absorption lines due to transitions from the ground state to the effective mass p-like levels. In addition to these p-like transitions there are transitions to the excited 1s-like states of the effective mass approximation. In applying a calibrated uniaxial stress to these samples, it was found that at least three of the four centers do not have the tetrahedral symmetry expected of a substitutional impurity atom. (Author)
AD-646 490 Not available from CFSTI.

RECOVERY PROCESSES AND ORDERING IN Ni3A1.
Wayne State Univ., Detroit, Mich.
For primary bibliographic entry see Field 20B.
AD-646 602 HC$3.00 MF$0.65

ELECTRONIC AND NUCLEAR PARAMAGNETISM AND ENERGY EXCHANGE MECHANISMS.
Final technical rept., Sep 65-Sep 66,
Saint Louis Univ., Mo. Dept. of Physics.
Sook Lee, and Vincent P. Jacobsmeyer. Jan 67, 78p
RADC-TR-66-627
Contract AF 30 (602)-2907

Descriptors: (*Sodium chloride, Paramagnetic resonance), (*Calcium fluorides, Paramagnetic resonance), (*Ruby, Paramagnetic resonance), (*Nuclear magnetic resonance, Polarization), Impurities, Hydrogen, Fluorine, Polarization, Line spectrum, Selection rules, Anisotropy, Hyperfine structure, Aluminum, Dipole moments, Heat treatment, Masers, Materials, Nuclear spins.
Identifiers: Solid state effect.

Large F19 NMR enhancements in CaF2 crystals containing atomic hydrogen have been obtained from the various types of forbidden transition lines in the atomic hydrogen ESR spectrum. Investigations of the Solid State Effect in polycrystalline solids, in which ESR centers possess a substantially anisotropic g- and hyperfine tensors, have been conducted and predictions have been made pertaining to the NMR enhancements from such materials. In addition, double magnetic resonance experiments in polycrystalline NaCl containing Cl (2-) centers have been completed and studies to understand the behavior of the Al27 NMR enhancement in ruby crystals have been performed. Also, a new ESR spectrum in CaF2, when treated at high temperatures and in a hydrogen atmosphere, is reported. (Author)
AD-646 620 HC$3.00 MF$0.65

A MOSSBAUER EFFECT STUDY OF ELECTRONIC RELAXATION IN THE PARAMAGNETIC COMPOUND: NH4 (Fe, Al)(SO4)2. 12 H2O.
Carnegie Inst. of Tech., Pittsburgh, Pa. Dept. of Physics.
For primary bibliographic entry see Field 7E.
AD-646 626 HC$3.00 MF$0.65

HIGH PRESSURE AND DIELECTRIC INVESTIGATIONS OF THE ALKALINE EARTH FLUORIDES.
Final rept. Oct 64-Jun 66,
Boston Coll., Chestnut Hill, Mass.
Joseph H. Chen, and Henry I. Smith. Aug 66, 186p

AFCRL-66-601
Contract AF 19(628)-4041

Descriptors: (*Alkaline earth compounds, Interactions), (*Fluorides, Interactions), (*Calcium fluorides, Interactions), (*Strontium compounds, Fluorides), (*Barium compounds, Fluorides), Crystal lattices, Atomic energy levels, High-pressure research, Equations of state, Molecular association, X-ray diffraction analysis, Quantum statistics, Crystal lattice defects, Samarium, Uranium, Impurities, Dielectric properties, Relaxation time.
Identifiers: Barium fluoride, Strontium fluoride.

The interactions between ions in the alkaline earth fluorides were investigated by means of two independent studies: (1) direct evaluation of the repulsive interaction, and (2) dielectric relaxation measurements on doped samples. With respect to (1), the experimental approach was to apply pressure up to about 65 kilobars directly to samples of CaF2, SrF2, and BaF2 using a tetrahedral-anvil press. The change of lattice spacing with pressure was determined by X-ray diffraction. These data were then analysed in terms of the Mie-Gruneisen equation of state to obtain the dependence of the repulsive lattice energy on interionic separation. From this, the magnitude and functional dependence of the repulsive interaction between ions was inferred using the theoretical formalism of the Born model. In the dielectric measurements, loss peaks were observed in samarium and uranium doped calcium fluoride crystals. The measurements covered a range from 1Hz to 300KHz and from 100C to 500C. The relaxation mechanism could be attributed to the rotation of dipoles made up to X393+) impurity ion at a Ca (2+) site and a change compensator F (-) at the nearest interstitial site. Activation energy obtained increased with increasing impurity ion size. (Author)
AD-646 654 HC$3.00 MF$0.65

ELECTROMAGNETIC WAVES IN A POLAR SEMI-CONDUCTOR IN THE PRESENCE OF A MAGNETIC FIELD,
Royal Inst. of Tech., Stockholm (Sweden). Microwave Dept.
Toshimitsu Musha. 21 Dec 66, 16p Scientific-14
RADC-TR-67-80
Contract AF 61(052)-895

Descriptors: (*Semiconductors, *Wave transmission), Sweden, Electromagnetic waves, Scattering, Phonons, Crystals, Magnetic fields, Propagation, Polarization, Partial differential equations, Magneto-optic effect.

The dispersion relation for optical phonons in an isotropic polar crystal in a static magnetic field is calculated. Due to the polar electromechanical coupling the waves are affected by the magnetic field and instead of two degenerate linearly polarized branches two circularly polarized separate branches are obtained. (Author)
AD-646 735 HC$3.00 MF$0.65

EXPERIMENTS ON THE a. c. ELECTROLUMINESCENCE OF Cu DOPED ZnS SINGLE CRYSTALS.
Interim rept.,
National Electrotechnical Inst., Turin (Italy).
G. Bonfiglioli, P. Brovetto, and A. Mojoni. 1965, 11p
AFOSR-67-0355
Grant AF-EOAR-87-63
Availability: Published in International Symposium on Luminescence, The Physics and Chemistry of Scintillators, Munich p378-85 1965.

Descriptors: (*Semiconductors, *Scintillation), (*Zinc sulfides, *Electroluminescence), Crystal lattice defects, Impurities, Copper, Alternating current, Heat treatment, Hardness, Dislocations, Microstructure, Italy.

Results are reported of a study on the a.c. electroluminescence (EL) of Cu-doped ZnS single crystals. Several aspects of a thermally induced aging effect are briefly described, which include evolution with thermal treatment of the light-voltage relationship parameters, hardness increase, dislocations decoration, and optical microscope evidence of the conversion of the EL patterns from 'hair-like' to 'comet-shaped' form. Pictures are also shown that give information as to the phase relationship of the light emitted from different specimen areas. The qualitative implications of these results as to the current theories are discussed. (Author)
AD-646 802 Not available from CFSTI.

FIELD DEPENDENCE OF SPIN-LATTICE RELAXATION TIMES OF Cr (3+),
McGill Univ., Montreal (Quebec).
N. Rumin. 19 Oct 65, 13p
Research supported in part by DRB and NRC.
Availability: Published in Canadian Journal of Physics v44 p1387-99 1966.

Descriptors: (*Chromium, *Paramagnetic resonance), Nuclear spins, Crystal lattices, Interactions, Relaxation time, Potassium compounds, Cobalt compounds, Cyanides, Alumina, Rubidium compounds, Aluminum compounds, Sulfates, Atomic energy levels, Phonons, Canada.

Relative changes in the effective, one-phonon, spin-lattice relaxation time with transition, magnitude, and direction of magnetic field, frequency, and temperature were computed for Cr (3+) in K3Co (CN)6, Al2O3, and RbAl (SO4)2.12H2O from a simplified expression for the transition probability requiring knowledge of only the spin Hamiltonian for the particular salt. A comparison with published experimental data, augmented by measurements obtained as part of the present work, indicates that the changes are usually predicted to better than a factor of two. Calculations show that the pulse saturation, resonance-dispersion, and steady-state saturation techniques should yield the same effective spin-lattice relaxation time for an S > 1/2 spin system, when the return to equilibrium is characterized by a simple exponential. (Author)
AD-646 822 Not available from CFSTI.

CREEP OF INTRINSIC AND GALLIUM-DOPED GERMANIUM,
Michigan Technological Univ., Houghton. Dept of Metallurgical Engineering.
Michael M. Shea, Lester E. Henderickson, and Lloyd A. Heidt. 27 May 66, 6p
AFOSR-67-0348
Grant AF-AFOSR-846-65
Availability: Published in Journal of Applied Physics v37 n12 p4572-4 Nov 1966.

Descriptors: (*Germanium, *Creep), Semiconductors, Doping, Gallium, Crystal lattice defects, Dislocations, Deformation, Crystals, Strain (Mechanics), Heat of activation.

The strain-time characteristics of germanium crystals bent by a constant four point load were studied at temperatures between 450 and 550C. Bar specimens oriented for single slip were prepared from intrinsic crystals and from p-type crystals heavily doped with gallium; dislocation densities of all specimens before bending were <400/sq cm. The heavy gallium doping prolongs the duration of the initial region of the strain-time curve, which is characterized by an increasing strain rate, and retards the stationary strain rate of the second region. The temperature dependence of the stationary strain rate is described by an activation energy of 1.65 eV for the intrinsic and 1.75 eV for the p-type material. Both the temperature dependence of the creep parameters and the retarding effects of gallium doping reflect the characteristics of dislocation velocities in these crystals. (Author)
AD-646 829 Not available from CFSTI.

DIRECT MEASUREMENT OF THE DEPLETION LAYER WIDTH VARIATION VS APPLIED BIAS FOR A P-N JUNCTION,
California Univ., Berkeley. Dept. of Electrical Engineering.
N. C. MacDonald, and T. E. Everhart. 11 Aug 65, 5p
AFOSR-67-0344
Contract AF 33(615)-1045, Grant AF-AFOSR-139-64
Availability: Published in Applied Physics Letters v7 n10 p267-9 Nov 15 1965.

Descriptors: (*Semiconductors, Electron microscopy), (*Field effect transistors, Microstructure), Silicon, Aluminum, Oxides, Electron beams, Electric currents, Interfaces, Doping.
Identifiers: Metal oxide semiconductors, Semiconductor junctions.

Using the scanning electron microscope, the width of the depletion region of a reverse-biased silicon N (+)-P junction was measured as a function of the applied voltage. It was observed that as the reverse bias across the junction is increased, dynomial broadening of the depletion layer occurs in both the voltage-contrast and the electron-beam-induced current modes of operation. The specimens were angle lapped to expose the junction profile. Measurement of the depletion layer width was a function of the reverse bias V sub R followed the familiar 'w (alpha) (V sub R) to the 1/2 power' relationship for an abrupt junction. (Author)
AD-646 836 Not available from CFSTI.

RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Columbia Radiation Lab., New York.
For primary bibliographic entry see Field 9C.
AD-646 898 HC$3.00 MF$0.65

DETECTOR INVESTIGATION FOR 8-15 AND 100-4000 MICRON REGIONS.
Naval Research Lab., Washington, D. C.
For primary bibliographic entry see Field 17E.
AD-646 927 HC$3.00 MF$0.65

DISORDER ENTROPY OF ICE.
Hokkaido Univ., Sapporo (Japan). Inst. of Low Temperature Science.
Y. Suzuki. 1966. 46p REPT.-775
Its Contrib. From The Inst. Of Low Temp. Sci., Ser. A, No. 21

Descriptors: *Entropy, *Ice, Atom, Boltzmann distribution, Bond, Cryogenic, Disorder, Equation, Hydrogen, Lattice, Oxygen, Value, Water.

For abstract, see STAR 05 06.
N67-15458 HC$3.00 MF$0.65

QUANTUM MECHANICAL STUDY OF MOLECULES - PREDICTION OF THE GROUND, IONIZED AND EXCITED STATES OF THE UNKNOWN NF MOLECULE.
New York Univ., N. Y.
R. C. Sahni. Jan 67, 23p NASA-CR-688
Grant NSG-76

Descriptors: *Diatomic molecule, *Molecular energy, *Nitrogen fluoride, *Prediction theory, Atmosphere, Bibliography, Carbon, Diatomic, Energy, Equilibrium, Excitation, Fluoride, Ground, Ionized, Isoelectronic, Mechanics, Molecular, Molecule, Monoxide, Nitrogen, Oxygen, Prediction, Property, Quantum, Stability, State, Theory, Transport, Upper.

For abstract, see STAR 05 06.
N67-15668 HC$3.00 MF$0.65

SUPERCONDUCTIVITY IN NB C- NB N SOLID SOLUTIONS.
Sverkhprovodimost V Tverdykh Rastvorakh Nbc-inhn
National Aeronautics and Space Administration, Washington, D. C.
O. I. Shulishova. Dec 66, 8p NASA-TT-F-10446
Transl. Into English From Izv. Akad. Nauk Sssr, Ser. Neorganisheskiye Materialy (Ussr), V. 2, No. 8, 1966 P 1434-1438

Descriptors: *Niobium alloy, *Solid solution, *Superconductivity, *Temperature effect, Alloy, Atom, Carbide, Composition, Critical, Effect, Metal, Niobium, Nitride, Nitrogen, Phase, Solid, Solution, Temperature, Transition.

For abstract, see STAR 05 06.
N67-15689 HC$3.00 MF$0.65

THE DEPENDENCE OF CERTAIN ELECTROPHYSICAL AND THERMOPHYSICAL PROPERTIES OF ZIRCONIUM MONOCARBIDE ON CARBON CONTENT IN THE HOMOGENEITY REGION.
Zavisimost' Nekotorykh Elektro- I Teplofizicheskikh Svoystv Monokarbida Tsirkoniya Ot Soderzhaniya Ugleroda V Oblasti Gomogennosti
National Aeronautics and Space Administration, Washington, D. C.
A. I. Avgustinik, O. A. Golikova, G. M. Klimashin, V. S. Neshpor, and S. S. Ordanyan. Dec 66, 8p NASA-TT-F-10448
Transl. Into English From Izv. Akad. Nauk Sssr, Ser. Neorganicheskiye Materialy (Moscow), V. 2, No. 8, 1966 P 1439-1444

Descriptors: *Electric property, *Thermophysical property, *Zirconium carbide, Carbide, Carbon, Composition, Conductivity, Electric, Electrophysics, Hall coefficient, Homogeneity, Property, Resistance, Specific, Thermal, Thermophysical, Zirconium.

For abstract, see STAR 05 06.
N67-15845 HC$3.00 MF$0.65

BEAM ALIGNMENT TECHNIQUES BASED ON THE CURRENT MULTIPLICATION EFFECT IN PHOTOCONDUCTORS SUMMARY TECHNICAL PROGRESS REPORT.
General Precision, Inc., Little Falls, N. J. Aerospace Research Center.
For primary bibliographic entry see Field 17B.
For abstract, see STAR 05 06.
N67-16054 HC$3.00 MF$0.65

STUDY OF THIN DIELECTRIC FILMS FOR THERMO-DIELECTRIC ENERGY CONVERSION QUARTERLY REPORT, 1 MAR. - 31 MAY 1966.
Stanford Research Inst., Menlo Park, Calif.
C. Peltzer. Jun 66, 16p NASA-CR-81258, QR-3
Contract NAS2-3197

Descriptors: *Dielectric material, *Energy conversion, *Thin film, Bridge, Capacitance, Conversion, Cycling, Dielectric, Energy, Film, Frequency, Material, Temperature, Thermal, Thin, Vacuum, Voltage.

For abstract, see STAR 05 06.
N67-16510 HC$3.00 MF$0.65

CHARACTERIZATION OF CERAMIC MATERIALS FOR MICROELECTRONIC APPLICATIONS SUMMARY REPORT NO. 1, 23 NOV. 1965 - 23 NOV. 1966.
IIT Research Inst., Chicago, Ill.
A. J. Mountvala. 23 Nov 66, 113p NASA-CR-66253, IITRI-G6006-12
Contract NAS1-4870

Descriptors: *Barium titanate, *Ceramics, *Dielectric material, *Microelectronics, *Polycrystal, Barium, Characterization, Constant, Dielectric, Dispersion, Distribution, Frequency, Grain, Material, Particle, Property, Size, Titanate.

For abstract, see STAR 05 06.
N67-16566 HC$3.00 MF$0.65

EXISTENCE ET STRUCTURE DES MONOCARBURES DE TERRES RARES: ETUDE DE LEURS PROPRIETES MAGNETIQUES A BASSES TEMPERATURES (Existence and Structure of Rare-Earth Monocarbides: Study of their Low Temperature Magnetic Properties).
Commissariat a l'Energie Atomique Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 7B.
PB-174 030 HC$3.00 MF$0.65

TRANSITION SUPRACONDUCTRICE ET MAGNETORESISTANCE EN CHAMP FAIBLE D'UN ECHANTILION MONOCRISTALLIN DE NIOBIUM A 4,2K (Superconductive Transition and Low-Field Magnetoresistance of a Niobium Single Crystal at 4.2K).
Commissariat a l'Engergie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 20C.
PB-174 041 HC$3.00 MF$0.65

SPECULATION SUR LES DEFAUTS CRISTALLINS DANS UO2 ET UO2+x (Some Speculations Concerning Crystal Defects in UO2 and UO2+x).
Commissariat a l'Energie Atomique, Saclay (France).
W. D. Kingery. 1967, 20p
CEA-S-5
Presented at the Seminai re de Chimie des Solides Institut National des Sciences et Techniques Nucleaires. Text in French; attached summary in English.

Descriptors: (*Uranium compounds, *Crystal lattice defects), Oxides, Oxygen, Solid solutions, Ionization, Heat of activation, Grain boundaries, Thermodynamics, Crystallography, Optical properties, Electrical properties, France.
Identifiers: Uranous oxide.

Without doubt, the structure of UO2+x is more complex than usually described. However with the following hypotheses: (1) a molecular oxygen solution, (2) ionisation of this oxygen with an activation energy of about 2 eV, (3) association between the additional oxygen atoms in the range of high values of x, (4) an important role of dislocations, of grain-boundaries and of the surface in the range of low values of x, it is possible to explain the thermodynamic, crystallographical, optical and electrical properties of the uranium oxide in a rational and self-consistent way. (Author)
PB-174 042 HC$3.00 MF$0.65

CALCUL DES FORCES AGISSANT SUR UNE IMPURETE D'UN METAL SOUMIS A UN GRADIENT DE TEMPERATURE (Calculation of Forces Acting on an Impurity in a Metal Subjected to a Temperature Gradient).
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
Maurice Gerl. Dec 66, 39p CEA-R-3096
Text in French; attached summary in English.

Descriptors: (*Crystal lattice defects, Diffusion), (*Copper, Impurities), (*Silver, Impurities), (*Gold, Impurities), Transport properties, Electrostatics, Thermoelectricity, Electrons, Phonons, Scattering, Solid solutions, France.

In a metal subject to a temperature gradient, an impurity is submitted to both an electrostatic force due to the thermoelectric field and a force due to the scattering of electrons and phonons by this point defect. The scattering of the electrons is treated using a semi-classical approach and a quantum mechanical method. The numerical computation for several impurities in Cu, Ag, and Au requires the knowledge of the resistivity cross-section and of the thermoelectric power of the impurity in the metal. A tentative estimation of the force due to the phonon-scattering is given for the self-diffusion in Cu. However, the approximations of this calculation do not allow a good comparison with the force due to the electrons. (Author)
PB-174 047 HC$3.00 MF$0.65

20M. THERMODYNAMICS

TIME TO EXPLOSION FOR AN EXPLOSIVE SUBJECTED EXTERNALLY TO ELEVATED TEMPERATURES.
Picatinny Arsenal, Dover, N. J. Feltman Research Labs.
For primary bibliographic entry see Field 7D.
AD-459 649 HC$3.00

A BIBLIOGRAPHY OF REFERENCES FOR THE THERMOPHYSICAL PROPERTIES OF HELIUM-4, HYDROGEN, DEUTERIUM, HYDROGEN DEUTERIDE, NEON, ARGON, NITROGEN, OXYGEN, CARBON DIOXIDE, METHANE, ETHANE, KRYPTON, AND REFRIGERANTS 13, 14, AND 23.
National Bureau of Standards, Boulder, Colo.
18 May 65, 143p NBS-8808

Descriptors: (*Cryogenics, Bibliographies), (*Liquefied gases, Bibliographies), (*Refrigerants, Bibliographies), Helium, Hydrogen, Deuterium, Heavy water, Neon, Argon, Nitrogen, Oxygen, Carbon dioxide, Methane, Alkanes, Krypton, Thermal properties, Compressive properties, Thermal expansion, Vapor pressure, Melting point, Boiling point, Transition temperature, Phase diagrams, Specific heat, Enthalpy, Entropy, Acoustic properties, Thermal conductivity, Viscosity, Equations of state, Joule-Thomson effect, Surface tension.

This bibliography represents a search of the information storage and retrieval system of the Cryogenic Data Center. The storage and retrieval system contains approximately 11,000 references to properties of materials at cryogenic temperatures. The properties which were searched for are: PVT data, compressiblity, expansivity, vapor pressure, melting line, triple point, boiling point, critical point, solid transition points, phase diagram, latent heats, heat capacity, enthalpy, entropy, velocity of sound, thermal conductivity, viscosity, equations of state, Joule-Thomson coefficient, and surface tension. (Author)
AD-467 519 HC$3.00 MF$0.65

HEAT-TRANSFER AND SHEAR BETWEEN COAXIAL CYLINDERS FOR LARGE KNUDSEN NUMBERS.
Technical rept.,
California Univ., Berkeley. Inst. of Engineering Research.
D. Roger Willis. Jul 65, 19p AS-65-7
Contract Nonr-222 (45)

Descriptors: (*Cylindrical bodies, Heat transfer), Shear stresses, Superaerodynamics, Theory, Mathematical analysis, Equations, Iterative methods, Mathematical models, Rotation.
Identifiers: Knudsen number, Coaxial cylinders, Hurlbut's criterion.

The heat transfer between coaxial cylinders for a large knudsen number is obtained using the method of knudsen iteration. The BGK model equation,

together with an extension which allows the Prandtl number to be set arbitrarily, is used. Results are compared with those obtained by moment methods. It is found that the criterion proposed by Hurlbut (phys. fluids 7, 904, 1964) for validity of the free molecular results is reasonable. Results are also presented for the rotating cylinder problem in a high Knudsen number flow. (Author)
AD-469 851 HC$3.00 MF$0.65

A SURVEY STUDY ON THE EFFECTS OF VIBRATIONS, SOUND FIELDS AND PULSATIONS ON HEAT AND MASS TRANSFER FROM FLAT PLATES, CYLINDERS AND DUCTS.
Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 20D.
AD-475 428 HC$3.00 MF$0.65

A 56-MOMENT SYSTEM OF DIFFERENTIAL KINETIC EQUATIONS,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
R. G. Barantsev. 31 Oct 66, 18p FTD-HT-66-645
TT-67-60770
56-Momentnaya Sistema Differentsialnykh Kineticheskikh Uravnenii, unedited rough draft trans. of Aerodinamika Razreshennykh Gazov (USSR), n2 p98-113 1965.

Descriptors: (*Kinetic theory, *Differential equations), Gases, Distribution functions, Polynomials, Moments, Integral transforms, Integration, Functions, Hydrodynamics, USSR.

A differential equation system is obtained for the expansion coefficients of the distribution function in a monatomic rarified gas with respect to Hermite polynomials. This system contains moments up to the fifth order inclusive. The interest in these equations is supported by the desire to see general kinetic regularities in their structure, and it is not suppressed by the acknowledgement of the unreliability of their solution. From the cross section of the collision and the internal transform which characterize the mechanism of collisions between atoms, only four functionals remain in the obtained system. (Author)
AD-646 375 HC$3.00 MF$0.65

A NONSTATIONARY TEMPERATURE PROBLEM FOR A CYLINDRICAL SHELL REINFORCED BY A RING,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
S. M. Durgaryan. 18 Aug 66, 17p FTD-TT-65-2041
TT-67-60774
Unedited rough draft trans. of Vsesoyuznaya Konferentsiya po Teorii Plastin i Obolochek (no. 2) Lvov, 1961. Trudy, n.p., 1964 p452-60.

Descriptors: (*Structural shells, Thermal properties), (*Stiffened cylinders, Thermal stresses), Deformation, Rings, Reinforcing materials, Physical properties, Mechanical properties, USSR.

The report is devoted to the study of stressed and deformed states of thin-walled, reinforced cylindrical shells with changing temperatures.
AD-646 387 HC$3.00 MF$0.65

AN INVESTIGATION OF THE HEAT TRANSFER ASPECTS OF HORIZONTAL TWO-PHASE FLOW.
Cornell Univ., Ithaca, N. Y. Sibley School of Mechanical Engineering.
For primary bibliographic entry see Field 20D.
AD-646 398 HC$3.00 MF$0.65

THERMAL INSTABILITY IN A SPHERICAL REGION HEATED FROM BELOW,
RAND Corp., Santa Monica, Calif.
Michael Sherman, and Ivan Catton. Jan 67, 24p P-3516
Prepared in cooperation with Douglas Aircraft Co., Inc., Santa Monica, Calif.

Descriptors: (*Thermal properties, Stability), (*Fluids, Thermal properties), Heating, Spheres, Walls, Approximation (Mathematics).

The classical Rayleigh thermal stability problem of an infinite horizontal fluid layer heated from below is extended to the case of a fluid, confined within a rigid sphere whose wall is nonuniformly heated. The temperature distribution on the wall is specified so that a constant temperature gradient is established in the direction of the body force acting on the fluid ('heated from below'). Two different variational principles are presented, each equivalent to the eigenvalue problem for the critical Rayleigh number (the stability criterion). These principles form the basis for two approximate methods of determining upper bounds to the critical Rayleigh number. The critical Rayleigh number obtained is 16,132 (based on a unit diameter) which is almost ten times greater than that of the horizontal-layer configuration (based on a unit height). The results are compared with a previously published analysis and are found to be 10 percent lower. (Author)
AD-646 621 HC$3.00 MF$0.65

GENERALISATION OF THE THEORY OF A REGULAR HEAT REGIME WITH VARIABLE THERMAL CAPACITY AND THERMAL CONDUCTIVITY COEFFICIENTS,
Ministry of Aviation, London (England). Technical Information and Library Services.
L. I. Kudryashev, and L. N. Zhemkov. Jan 67, 13p TIL/T.5683
TT-67-60868
Obobshchenie Teorii Regulyarnogo Teplovogo Rezhima na Sluchai Peremennykh Koeffitsientov Toploemkosti i Teploprovo Dnosti, trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Priborostroenie (USSR) n6 p100-8 1958.

Descriptors: (*Thermodynamics, Theory), Thermal conductivity, Differential equations, Nonlinear differential equations, Thermodynamics, Thermal properties, USSR.

The nonlinear differential equation of thermal conductivity is linearised by using a thermodynamic potential and an integral argument in place of temperature and time. A general theory of thermal regularity is deduced which takes account of the variability of thermophysical properties of the material. The theory was varified experimentally. (Author)
AD-646 664 HC$3.00 MF$0.65

ROLE OF DISPERSION IN THE PROCESSES OF RADIANT EXCHANGE OF ENERGY,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
V. N. Adrianov. 7 Nov 66, 15p FTD-HT-66-303
TT-67-60876
Rolrasseyaniya v Protsessakh Luchistogo Obmena Energiei, unedited rough draft trans. of Teploenergetika (USSR), v8 n2 p63-6 1961.

Descriptors: (*Heat exchangers, *Thermal radiation), Heat exchangers, Integral equations, Differential equations, Absorption, Scattering, USSR.

The various problems in the theory of radiant exchange of energy lead to integral and integro-differential equations which have a very complicated mathematical structure. A strict and precise solution of these problems is not possible for the time being. Therefore all theoretical investigations of the different problems in radiant exchange of energy undertaken up to the present time in weakening media start from a number of simplified assumptions. Among such premises there is the assumption about the absence of dispersion in a medium (a purely absorbane one). Due to this as applicable to heat-technology problems, the character of the influence of dispersion in the process of radiant exchange has remianed unsolved in both qualitative and quantitative relationships. In fact each real medium to some extent possesses the property of dispersion, as a result of which the clarification of the role of dispersion or radiation in the radiant exchange of energy affords theoretical and practical interest. In connection with this, in this article an attempt is made also to fill the gap noted and to analyze the role of dispersion as applicable to the transfer of radiant energy in a plane-parallel stratum of a weakening medium. (Author)
AD-646 710 HC$3.00 MF$0.65

UPPER AND LOWER BOUNDS FOR SOLUTIONS TO THE TRANSPORT EQUATION.
Minnesota Univ., Minneapolis.
For primary bibliographic entry see Field 12B.
AD-646 801 Not available from CFSTI.

EQUATIONS AND COMPUTER PROGRAM TO CALCULATE THE THERMAL HISTORY OF A DUAL-LAYERED PLATE SUBJECT TO THE THERMAL PULSE OF A NUCLEAR WEAPON.
Naval Applied Science Lab., Brooklyn, N. Y.
For primary bibliographic entry see Field 13J.
AD-646 858 Not available from CFSTI.

GENERALIZATION OF THE MAXWELL CRITERION FOR VAN DER WAALS EQUATION,
Ballistic Research Labs., Aberdeen Proving Ground, Md.
G. D. Kahl. Oct 66, 14p BRL-1340
Presented at: Review of the Military Theme 'Hypersonic Research,' Army Research Office, Durham, N. C., 14-15 September 1966.
Availability: Published in Phys. Rev. Letters.

Descriptors: (*Equations of state, Partial differential equations), Thermodynamics, Vaporization, Specific heat, Entropy.

A method is proposed for generalizing the Maxwell equal-area rule for replacing isobaric isotherm segments in the condensing phase for van der Waals equation. The new vapor pressure isotherm cuts off unequal lobes by an amount depending on the internal energies and differing specific heats of the liquid and vapor phases. Improved predictions of both liquid specific heat and entropy of vaporization for some metals are demonstrated by a simple example. (Author)
AD-646 883 Not available from CFSTI.

AN IMPROVED CRYOGENIC LIQUID-LEVEL SENSOR,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 04.
ANL-7243 HC$3.00 MF$0.65

INVESTIGATION OF HEAT TRANSFER AT HIGH HEAT FLUX: EXPERIMENTAL STUDY OF HEAT TRANSFER AND FRICTION DROP WITH n-BUTYL ALCOHOL IN AN ELECTRICALLY HEATED TUBE.
Progress rept.,
Jet Propulsion Lab., Pasadena, Calif.
Frank Kreith, and Martin Summerfield. 17 May 49, 31p PR-4-95
ATI-63-763
Contract W-04-200-ORD-455

Descriptors: (*Butanols, *Heat transfer), Skin friction, Heat transfer coefficients, Pipes, Stainless steel, Boiling, Convection (Heat transfer), Experimental data, Heat flux, Surface temperatures.

Heat-transfer and friction coefficients have been obtained experimentally for n-butyl alcohol flowing upward in an electrically heated stainless-steel tube. The data extend over a heat-flux range from 0.2 to 2.6 Btu/sq in. sec in the pressure range from 30 to 250 psia at velocities from 20 to 40 ft/sec. The results of the experiments indicate that the heat-transfer characteristics of the n-butyl alcohol in the surface boiling regime are similar to those observed with water. When the heat-transfer surface temperature exceeds the boiling point of the liquid, the heat flux can be increased, and the velocity as well as the bulk temperature varied, without changing the surface temperature appreciably. The temperature of the surface-to-liquid interface in the surface boiling regime is determined primarily by the pressure on the liquid. (Author)
N63-83586 HC$3.00 MF$0.65

THE EFFECT OF SURFACE ROUGHNESS AND WAVINESS UPON THE OVERALL THERMAL CONTACT RESISTANCE.
Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.
B. B. Mikic, W. M. Rohsenow, and M. M. Yovanovich. Oct 66, 37p NASA-CR-81158, REPT.-76361-43
Contract NGR-22-009-065

Descriptors: *Contact resistance, *Heat flow, *Surface roughness, Channel, Contact, Contour, Equation, Flow, Heat, Load, Radius, Resistance, Roughness, Surface, Theory, Thermal, Vacuum.

For abstract, see STAR 05 06.
N67-15385 HC$3.00 MF$0.65

AN EXPERIMENTAL INVESTIGATION OF BOILING IN NORMAL AND ZERO GRAVITY.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
J. C. Aydelott, T. H. Cochran, and C. M. Spuckler. 1967, 14p NASA-TM-X-52264
Presented At The Inst. Of Environ. Sci. Ann. Meeting, Washington, 10-12 Apr. 1967

Descriptors: *Bubble, *Gravitational effect, *Heat transfer, *Nucleate boiling, *Subcooling, Boiling, Drag, Drop, Effect, Ethanol, Flux, Force, Gravitational, Model, Normal, Nucleate, Pressure, Rate, Surface, Tension, Test, Viscosity, Water, Zero.

For abstract, see STAR 05 06.
N67-16044 HC$3.00 MF$0.65

A THERMODYNAMIC FLOW ANALYSIS OF PARTICLE FORMATION EFFICIENCY IN A MIXED FLOW COLLOID THRUSTOR.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
D. S. Goldin. 1967, 14p NASA-TM-X-52265
Presented At The 5th Aerospace Sci. Meeting, 23-27 Jan. 1967, Sponsored By Aiaa

Descriptors: *Colloidal propellant, *Mixed flow, *Nozzle flow, *Thrustor, Colloid, Efficiency, Equation, Flow, Formation, Mixing, Model, Nozzle, Particle, Physical, Propellant, Temperature, Thermodynamic.

For abstract, see STAR 05 06.
N67-16045 HC$3.00 MF$0.65

EXPERIMENTAL STUDY OF EQUILIBRIUM AIR TOTAL RADIATION.
General Electric Co., Philadelphia, Pa.
J. S. Gruszczynski, and W. R. Warren. 31 Aug 65, 22p NASA-CR-81255
Contract NASW-1303

Descriptors: *Blunt body, *Flow field, *Thermal radiation, Air, Blunt, Body, Earth, Energy, Entry, Equilibrium, Field, Flow, Gas, Heating, Radiation, Radiative, Shock, Thermal, Transfer, Tube.

For abstract, see STAR 05 06.
N67-16513 HC$3.00 MF$0.65

THE THERMAL CONDUCTION PROCESS IN CARBONACEOUS CHARS.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
R. G. Nagler. 1 Feb 67, 19p NASA-CR-81295, JPL-TR-32-1010
Contract NAS7-100

Descriptors: *Char, *Nylon, *Thermoconductivity, Atmospheric, Carbonaceous, Graphite, Phenol, Porosity, Reentry, Temperature, Time.

For abstract, see STAR 05 06.
N67-16556 HC$3.00 MF$0.65

CONVECTIVE AND RADIATIVE HEAT TRANSFER TO AN ABLATING BODY, PART I FINAL REPORT.
Lockheed Missiles and Space Co., Palo Alto, Calif.
A. Hoshizaki, and L. E. Lasher. Jul 66, 79p NASA-CR-73060, LMSC-4-06-66-12
Contract NAS7-386

Descriptors: *Ablation, *Atmospheric entry, *Convective heat transfer, *Heat shield, *Radiative heat transfer, Absorption, Analysis, Atmospheric, Coefficient, Continuity, Convection, Energy, Entry, Equation, Gas, Heat, Heat transfer, Layer, Momentum, Numerical, Property, Pyrolysis, Radiative, Shield, Shock, Thermodynamic, Transport, Vehicle.

For abstract, see STAR 05 06.
N67-16567 HC$3.00 MF$0.65

EMISSIVITY COATINGS FOR LOW-TEMPERATURE SPACE RADIATORS QUARTERLY PROGRESS REPORT, 1 JUL. - 30 SEP. 1966.
Lockheed Missiles and Space Co., Sunnyvale, Calif. Aerospace Sciences Lab.
J. R. Grammer. 30 Sep 66, 41p NASA-CR-72130, QPR-5
Contract NAS3-7630

Descriptors: *Material testing, *Protective coating, *Spacecraft radiator, *Ultraviolet radiation, Absorption, Coating, Compound, Emissivity, Low temperature, Material, Oxide, Potassium, Protection, Radiation, Radiator, Silicone, Solar, Spacecraft, Testing, Ultraviolet, Zinc, Zirconium.

For abstract, see STAR 05 06.
N67-16568 HC$3.00 MF$0.65

DETERMINATION OF THE EMISSIVITY OF MATERIALS SEMIANNUAL PROGRESS REPORT, 15 MAY - 14 NOV. 1966.
Pratt and Whitney Aircraft, East Hartford, Conn.
R. C. Emanuelson, and W. L. Luoma. 20 Dec 66, 28p NASA-CR-72149, PWA-2979
Contract NAS3-4174

Descriptors: *Material testing, *Nuclear power plant, *Protective coating, *Space radiator, *Titanium alloy, Adherence, Aging, Alloy, Coating, Columbium, Cycling, Emission, Endurance, Iron, Material, Nuclear, Plant, Powder, Power, Pressure, Protection, Radiator, Space, Stainless, Steel, Testing, Thermal, Titanium, Tube, Zirconium.

For abstract, see STAR 05 06.
N67-16569 HC$3.00 MF$0.65

COMPUTER CODES FOR THERMAL DESIGN OF POTASSIUM BOILERS AND CONDENSERS.
General Electric Co., Cincinnati, Ohio.
D. R. Ferguson. 1966, 120p NASA-CR-72141, R66SD3017
Contract NAS3-2528

Descriptors: *Boiler, *Code, *Condenser, *Fortran, *Liquid potassium, *Thermal power, Coefficient, Computer, Counterflow, Design, Digital, Fluid, Format, Heat, Length, Liquid, Mechanics, Potassium, Power, Pressure, Program, Rankine cycle, System, Temperature, Thermal, Transfer, Tube, Vapor.

For abstract, see STAR 05 06.
N67-16570 HC$3.00 MF$0.65

CONVECTIVE AND RADIATIVE HEAT TRANSFER TO BLUNT BODIES AT ANGLE OF ATTACK, PART II FINAL REPORT.
Lockheed Missiles and Space Co., Palo Alto, Calif.
H. Hoshizaki. Jul 66, 62p NASA-CR-73061, LMSC-4-06-66-11
Contract NAS7-386

Descriptors: *Angle of attack, *Blunt body, *Convective heat transfer, *Radiative heat transfer, Absorption, Angle, Approximation, Attack, Blunt, Body, Boundary, Coefficient, Convection, Difference, Distribution, Energy, Equation, Finite, Gas, Heat transfer, Layer, Method, Momentum, Profile, Property, Radiative, Shape, Shock, Solution, Thermodynamic, Transport, Velocity.

For abstract, see STAR 05 06.
N67-16571 HC$3.00 MF$0.65

COOLDOWN OF CRYOGENIC TRANSFER LINES AN EXPERIMENTAL REPORT.
National Bureau of Standards, Boulder, Colo.
J. A. Brennan, E. G. Brentari, R. V. Smith, and W. G. Steward. 7 Nov 66, 75p NASA-CR-81338, NBS-9264
NASA ORDER R-45

Descriptors: *Cryogenic fluid, *Heat transfer, *Liquid cooling, Boiling, Cooling, Cryogenic, Flow, Fluid, Hydrogen, Line, Liquid, Nitrogen, Pressure, Subcooling, Temperature, Transfer.

For abstract, see STAR 05 06.
N67-16620 HC$3.00 MF$0.65

A SURVEY OF THERMAL RADIATION STUDIES OF ABLATING BODIES IN THE BALLISTIC RANGE.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
W. A. Page. Feb 67, 23p NASA-TN-D-3741
Contract 129-01-08-16-21

Descriptors: *Ablating material, *Ballistic range, *Thermal radiation, Ablation, Ballistics, Boundary, Carbon, Layer, Material, Oxygen, Polyethylene, Radiation, Range, Ratio, Resin, Thermal, Wake.

For abstract, see STAR 05 06.
N67-16686 HC$3.00 MF$0.65

CORRELATION OF FREE-FLIGHT TURBULENT HEAT-TRANSFER DATA FROM AXISYMMETRIC BODIES WITH COMPRESSIBLE FLAT-PLATE RELATIONSHIPS.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
E. M. Sullivan, and E. V. Zoby. Jan 67, 22p NASA-TN-D-3802
Contract 711-02-04-01-23

Descriptors: *Axisymmetric body, *Flat plate, *Free flight, *Turbulent heat transfer, Axisymmetry, Blunt, Body, Compressible, Cone, Flat, Flight, Free, Friction, Heat transfer, Plate, Skin, Turbulent.

For abstract, see STAR 05 06.
N67-16691 HC$3.00 MF$0.65

CONDENSATION OF DRY AIR ON A LIQUID HYDROGEN COOLED SURFACE IN THE PRESSURE RANGE .001 TO 10 torr (KNUDSEN NUMBER OF .0001 TO 1),
National Bureau of Standards, Boulder, Colo. Cryogenics Div.
J. Hord. 29 Mar 66, 9p
Research supported in part by NCAR. Cryogenics p285-93 Oct 1966.

Descriptors: (*Hydrogen, Liquefied gases), (*Air, Condensation), (*Upper atmosphere, Samplers), (*Samplers, Condensers (Liquefiers)), Fluid flow, Superaerodynamics, Cryogenics, Thermodynamics, Knudsen number, Pressure, Surfaces, Cooling.

Cryosurface geometry consisted of coiled stainless steel tubes and a flat copper plate. Free molecule flow theory appears to predict adequately condensation rates for high conductance systems in the transition pressure regime. This formulation predicts flow rates higher than experiment for pressures in the continuum range, and thus should not be extended beyond the transition pressure regime. It was observed that simple continuum bulk flow theory agrees fairly well with extrapolated free molecule theory throughout the pressure range investigated (bulk flow formulae should not be used in the free molecule pressure regime). The bulk flow theory is preferable at continuum pressures and for practical engineering systems with appreciable pressure drop is preferable throughout the transition pressure range. Additional experimentation is needed in the .001-10 torr pressure range to obtain precise cryodeposit surface temperature data. Such data may permit the evaluation of a detailed bulk flow analysis. The measured temperature difference between metal wall and refrigerant was higher than predicted values for pool boiling liquid hydrogen. The larger difference was attributed to boiling inside tubes which inhibits vapour escape. Predicted values are for boiling outside of tubes, rods, plates, etc. The heat flux required to cause surging loss of liquid hydrogen from two different size coiled tubes was experimentally determined at about 0.3g (parallel to tube axis). This critical heat flux was so low that boiling liquid hydrogen refrigeration was abandoned and forced flow of supercritical pressure liquid hydrogen was adopted. (Author)
PB-174 024 HC$3.00 MF$0.65

PROPERTIES OF LIQUID HYDROGEN (Proprietes de l'Hydrogene Liquide),
National Bureau of Standards, Boulder, Colo. Inst. for Materials Research.
Robert J. Corruccini. 1965, 43p
Liquid Hydrogen (Properties, Production and Application p65-106 1965. Text in English and French.

Descriptors: (*Hydrogen, Physical properties), (*Liquefied gases, Physical properties), Cryogenics, Thermal properties.

A survey was made on the available knowledge of those physical properties of liquid hydrogen that are of technological importance. First, some of the physics that explains the special characteristics of hydrogen are presented. Then a catalog of the major sources of data and extracts of these data are given. (Author)
PB-174 026 HC$3.00 MF$0.65

DENSITY-TEMPERATURE FORMULAE FOR COEXISTING LIQUID AND VAPOR AND FOR FREEZING LIQUID PARAHYDROGEN,
National Bureau of Standards, Boulder, Colo. Cryogenics Div.
Robert D. Goodwin. 21 Jun 66, 4p
Journal of the National Bureau of Standards - A. Physics and Chemistry v70A n6 p541-4 Nov-Dec 1966. Research supported in part by NASA.

Descriptors: (*Hydrogen, Density), (*Liquefied gases, Temperature), Vapors, Liquids, Freezing, Phase studies, Cryogenics.
Identifiers: Parahydrogen.

A single formula is given for coexistence temperature as a continuous function of the vapor-liquid densities. With six coefficients and seven adjusted exponents, it may conveniently replace the several formulae formerly used in separate regions of the data. Freezing liquid densities are described by a simple power law in temperature, replacing more complicated formulae. Computed results are tabulated and compared with the derived data. (Author)
PB-174 027 HC$3.00 MF$0.65

20N. WAVE PROPAGATION

INTERACTIONS BETWEEN NESTED RHOMBIC ANTENNAS,
National Bureau of Standards, Boulder, Colo.
For primary bibliographic entry see Field 9E.
AD-270 503 HC$3.00

NOTE ON THE EFFECT OF SHADOWING ON THE BACKSCATTERING OF WAVES FROM A RANDOM ROUGH SURFACE,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
R. A. Brockelman, and T. Hagfors. 24 Nov 65, 9p
Supported by U. S. Air Force.
Availability: Published in IEEE Transactions on Antennas and Propagation p621-6 Sep 1966.

Descriptors: (*Electromagnetic waves, Backscattering), Surfaces, Roughness, Noise (Radio), Radio astronomy, Theory.

A one dimensional random rough surface is modeled as a Gaussian noise signal. The effect of shadowing in the case of backscattering of waves from such a surface is studied in the geometric optic limit by analyzing the Gaussian noise signal in a digital computer. It is found that presently accepted theories for the shadowing effect are of doubtful validity. (Author)
AD-646 482 Not available from CFSTI.

RADAR VERIFICATION OF THE DOPPLER FORMULA,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Irwin I. Shapiro, Michael E. Ash, and Menasha J. Tausner. 26 Sep 66, 3p
Research supported in part by USAF.
Availability: Published in Physical Review Letters v17 n17 p933-5 Oct 24 1966.

Descriptors: (*Doppler effect, Measurement), Planets, Radar echo areas, Radio astronomy, Velocity, Interplanetary trajectories, Antennas, Relativity theory, Rotation, Light, Equations.

The report contains solid curves which represent the theoretical second-order velocity contributions to the Doppler shift calculated from the standard Newcomb orbits for the inner planets. The data points were obtained from the measurements by subtracting the first-order theoretical contributions. (Author)
AD-646 487 Not available from CFSTI.

COHERENT PULSE TRANSMISSION THROUGH RAIN.
Technical note,
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
R. K. Crane. 27 Dec 66, 31p TN-1966-63
ESD-TR-66-601
Contract AF 19 (628)-5167

Descriptors: (*Coherent radiation, Attenuation), (*Rain, Wave transmission), Radiofrequency pulses, Microwaves.

The problem of received signal degradation for coherent pulse transmission through a rain scattering volume was investigated for large bandwidth transmission at 4.0, 8.0, 15.5 and 34.86GHz. Calculations of pulse length and total pulse energy were made for different path lengths through the rain volume. The calculations were made for models of heavy and extreme rainfall, using rain rates 49.0 and 196.3mm/hr. The results of the computations show that for the rain rates considered, the dominant cause of signal degradation is attenuation. Negligible pulse lengthening was noted at 34.86GHz. For rain rates above 196mm/hr. and frequencies of 15.5 and 8.0GHz, measurable values of pulse lengthening were calculated for bandwidths above 2.0GHz. At 4.0GHz, measurable values of pulse lengthening were obtained for both rain rates considered. (Author)
AD-646 623 HC$3.00 MF$0.65

SELECTION OF A VLF RECEIVING ANTENNA FOR THE BOLIVIAN SOLAR ECLIPSE SITE.
Naval Ordnance Lab., Corona, Calif.
For primary bibliographic entry see Field 9E.
AD-646 629 HC$3.00 MF$0.65

CLOUD DROPLET MICROWAVE DISPERSION EFFECTS ON LINE INTEGRAL REFRACTOMETER MEASUREMENTS,
Mitre Corp., Bedford, Mass.
For primary bibliographic entry see Field 4A.
AD-646 718 HC$3.00 MF$0.65

MICROWAVE RADIOMETRIC STUDIES IN RELATION TO MINE DETECTION,
Army Engineer Research and Development Labs., Fort Belvoir, Va.
For primary bibliographic entry see Field 19A.
AD-646 730 HC$3.00 MF$0.65

ELECTROMAGNETIC WAVES IN A POLAR SEMI-CONDUCTOR IN THE PRESENCE OF A MAGNETIC FIELD,
Royal Inst. of Tech., Stockholm (Sweden). Microwave Dept.
For primary bibliographic entry see Field 20L.
AD-646 735 HC$3.00 MF$0.65

GEOMETRICAL ACOUSTICS IN MAGNETIC MATERIALS.
Stanford Univ., Calif. Microwave Lab.
For primary bibliographic entry see Field 20A.
AD-646 792 Not available from CFSTI.

TABLES OF SPHEROIDAL WAVE FUNCTIONS. PART I. OBLATE RADIAL FUNCTIONS OF THE FIRST AND SECOND TYPE.
Naval Research Lab., Washington, D. C.
For primary bibliographic entry see Field 12A.
AD-646 793 HC$3.00 MF$0.65

A MODEL OF RADAR SCATTERING FROM THE CONE-SPHERE.
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
For primary bibliographic entry see Field 17I.
AD-646 853 HC$3.00 MF$0.65

UTILIZATION OF THE RECIPROCITY THEOREM TO DETERMINE THE NEAR FIELD AIR-TO-SUBSURFACE PROPAGATION FORMULAS.
Research rept.,
Navy Underwater Sound Lab., New London, Conn.
Peter R. Bannister. 22 Nov 66, 24p USL-786

Descriptors: (*Dipole antennas, *Propagation), Radio transmission, Electric fields, Magnetic fields, Theorems, Air-to-surface, Underground.
Identifiers: Reciprocity theorem (Electromagnetic).

The electric and magnetic field components produced by vertical and horizontal dipoles (both electric and magnetic types) located at or above the surface of a plane, conducting, homogeneous earth are derived for the near field range. The height h of the transmitting antenna is > or = 0 (+), while the depth z of the receiving antenna is < or = 0 (-) (air-to-subsurface propagation). Ionospheric effects are neglected. The derivations are based upon application of the reciprocity theorem to previously derived field components. It is observed that these equations reduce to well-known expressions when the horizontal separation between the transmitting and receiving antennas is much greater than h. (Author)
AD-646 855 HC$3.00 MF$0.65

SOME CALCULATIONS OF IONOSPHERIC REFLECTION COEFFICIENTS FOR LOW FREQUENCY RADIO WAVES.
Technical rept.,
Royal Aircraft Establishment, Farnborough (England).
B. Burgess, and Greta C. A. Sunderland. Jul 66, 29p TR-66221

Descriptors: (*Ionospheric propagation, Reflection), Radio transmission, Low frequency, Radio waves, Radio navigation, Great Britain, Differential equations.

Results are presented of the computation of the reflective properties of a sharply bounded ionosphere for low frequency radio waves. The method of Barber and Crombie has been adopted. It is shown that for this model of ionosphere the phase of the reflection coefficient varies with frequency in a manner which is of importance when radio navigational aids in this frequency band are considered. (Author)
AD-646 900 HC$3.00 MF$0.65

PROGRESS IN SCIENTIFIC RADIO - FIFTEENTH GENERAL ASSEMBLY OF THE INTERNATIONAL SCIENTIFIC RADIO UNION.
National Academy of Sciences-national Research Council, Washington, D. C.
1966, 378p NASA-CR-81249, PUBL.-1468
Contract NSR-09-012-907
Gen. Assembly Held In Munich, 5-15 Sep. 1966

Descriptors: *Atomic clock, *Conference, *International cooperation, *Radar astronomy, *Radio frequency, *Radio signal propagation, *Space communication, Antenna, Astronomy, Atmosphere, Atom, Beam, Cesium, Clock, Communication, Cooperation, Cospar, Density, Earth, Electromagnetic, Electron, Frequency, Infrared, International, Ionization, Ionosphere, Magnetosphere, Noise, Optics, Planet, Propagation, Radar, Radio, Satellite, Science, Signal, Space, Standardization, Time, Wave.

For abstract, see STAR 05 06.
N67-16001 HC$3.00 MF$0.65

PROPAGATION AT 5 GHz IN EUROPE, A COMPARISON OF PREDICTIONS AND MEASUREMENTS FOR VARIOUS TYPES OF PATHS.
Technical rept.,
Institutes for Environmental Research, Boulder, Colo.
C. F. Peterson, J. E. Farrow, F. M. Capps, and C. A. Samson. Jul 66, 136p ITSA-2
IER-2

Descriptors: (*Radio transmission, Superhigh frequency), Europe, Troposphere, Signal-to-noise ratio, Measurement, Predictions, Mountains, Diffraction, Scattering, Attenuation, Meteorological parameters.

The results presented here will give an increased appreciation of the problems and potentialities for the use of these frequencies for trans-horizon propagation. The data presented here were gathered over paths typical of line-of-sight, diffraction, and tropospheric scatter circuits used throughout the world to carry long-distance voice and digital information. (Author)
PB-173 991 HC$3.00 MF$0.65

SOME GEOMAGNETIC AND IONOSPHERIC EFFECTS IN ANTARCTICA PRIOR TO STORM SUDDEN COMMENCEMENTS.
Avco Corp., Wilmington, Mass. Avco Space Systems Div.
For primary bibliographic entry see Field 4A.
PB-173 998 HC$3.00 MF$0.65

THE NATURE OF SPREAD-F IRREGULARITIES IN ANTARCTICA.
Avco Corp., Wilmington, Mass. Avco Space Systems Div.
For primary bibliographic entry see Field 4A.
PB-174 000 HC$3.00 MF$0.65

FADING STATISTICS ON A 212-km LINE-OF-SIGHT OVERWATER RADIO PATH AT 1760MHz.
Technical rept.,
Institutes for Environmental Research, Boulder, Colo.
John S. Nicolis. Nov 66, 90p ITSA-14
IER-14
See also PB-174 054.

Descriptors: (*Microwaves, Attenuation), (*Radio transmission, Ultrahigh frequency), Antennas, Refractive index, Radio signals, Scattering, Periodic variations.

The paper gives a theoretical and experimental survey of the statistical behavior of UHF radio signals, both in time and space, as received over a very long line-of-sight path with great clearance above the east Mediterranean Sea for the period 3 July 1964 to 29 June 1965. Comparison between the above mentioned 'correlograms' and those theoretically derived for the simple two-ray model in an atmosphere with a constant gradient of refractive index proves its inadequacy most of the time for explaining the structure of the fading pattern in time and space. (Author)
PB-174 052 HC$3.00 MF$0.65

SOME ASPECTS OF THE DEEP AND/OR RAPID FADING PHENOMENA IN STRICTLY LINE-OF SIGHT UHF/SHF PROPAGATION.
Technical rept.,
Institutes for Environmental Research, Boulder, Colo.
John S. Nicolis. Jan 67, 95p ITSA-23
IER-23
See also PB-174 052.

Descriptors: (*Radio transmission, Superhigh frequency), (*Attenuation, Ultrahigh frequency), Measurement, Statistical analysis, Troposphere, Scattering, Meteorological parameters.

The paper contains an analysis of some experimental results from three line-of-sight UHF and SHF radio paths of different lengths and a common terminal, in which reflections from the earth's boundary are avoided by a suitable choice of the individual path profiles and the characteristics of the antennas used. (Author)
PB-174 054 HC$3.00 MF$0.65

21. PROPULSION AND FUELS

21A. AIR-BREATHING ENGINES

PRELIMINARY ANALYSIS OF THE EFFECTIVENESS OF VARIABLE-GEOMETRY GUIDE VANES TO CONTROL ROTOR-INLET FLOW CONDITIONS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
J. E. Crouse, and R. J. Steinke. Jan 67, 19p
NASA-TN-D-3823
Contract 720-03-01-48-22

Descriptors: *Compressor rotor, *Control stability, *Guide vane, *Inlet flow, *Variable geometry structure, Air, Angle, Blade, Breathing, Compressor, Computer, Control, Design, Distribution, Engine, Extension, Feasibility, Flight, Flow, Geometry, Guide, High speed, Incidence, Inlet, Mass, Program, Radial, Rotor, Stability, Structure, Tip, Turbomachine, Vane, Variable, Velocity.

For abstract, see STAR 05 06.
N67-15666 HC$3.00 MF$0.65

21B. COMBUSTION AND IGNITION

IGNITION OF A STOICHIOMETRIC MIXTURE IN A LAMINAR SUPERSONIC BOUNDARY LAYER OF A FLAT PLATE.
Foreign Technology Div., Wright-Patterson AFB, Ohio.
I. F. Shakhnov. 27 Sep 66, 21p FTD-HT-66-472
TT-67-60782
Unedited rough draft trans of Akademiya Nauk SSSR. Izvestiya. Mekhanika, n3 p17-24 1965.

Descriptors: (*Fuels, Ignition), (*Ignition, *Laminar boundary layer), Supersonic flow, Flat plate models, Mixture, Hydrocarbons, Air, Flames, Numerical analysis, USSR.

Flow is examined in the regime of ignition of laminar boundary layer on an impermeable flat plate when a uniform supersonic flow of a stoichiometric misture of gaseous hydrocarbon fuel and air approaches the plate at a zero angle of attack. It is assumed that there is no external pressure gradient, the temperature of the plate is constant, and the concentrations of the chemical components on the external boundary of the boundary layer are equal to their initial values in the approaching flow. As a result of numerical integration of the nonself-similar equations of the boundary layer by the method of grids, the dependence of the plate length necessary for the formation of a flame front upon the basic kinetic coefficients and values of the parameters of the approaching flow is found. (Author)
AD-646 426 HC$3.00 MF$0.65

REDUCTION OF DRAG OF A PROJECTILE IN A SUPERSONIC STREAM BY THE COMBUSTION OF HYDROGEN IN THE TURBULENT WAKE.
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
For primary bibliographic entry see Field 20D.
AD-646 436 HC$3.00 MF$0.65

A STUDY OF SHOCK WAVE INDUCED REACTIONS.
Final scientific rept., 15 Jan 62-24 Jun 66,
General Electric Co., Schenectady, N. Y. Research and Development Center.
Donald R. White. Sep 66, 46p Rept. no. 66-GC-0336
ARL-66-0177
Contract AF 33 (657)-7945

Descriptors: (*Shock waves, Chemical reactions), (*Detonations, Chemical reactions), Thermochemistry, Ignition, Relaxation time, Hydrogen, Oxidation, Reaction kinetics, Fluid mechanics.

A technique for generation of a laminar reaction zone in a detonable mix was found. Density measurements in these and in incident shock experiments confirmed existence of the 'von Neumann spike' and demonstrated that the density there corresponds to full vibrational relaxation without chemical reaction for the combustion of D2, H2, C2H2, C2H4, CH4, and CO. A systematic study of vibrational relaxation of diatoms has resulted in an empirical correlation of relaxation time as a function of oscillator strength, reduced mass, and temperature that has superior predictive abilities. It was demonstrated that induction time is an insensitive function of the relaxation time of the reactants. The activation energy for shock-induced exothermic reaction in D2, H2, C2H2, and C2H4 is measured to be about 17.3 kcal/mole, and the induction times are in the ratio of 1.5, 1, 0.5, and 0.4, respectively, for a very lean stoichiometry. In reflected shock ignition studies, an activation energy of 17.3 kcal/mole is approached for low-pressure experiments and at higher pressure the density-normalized induction time increases markedly with pressure, yielding a much higher apparent activation energy. This is presumably due to the increasing importance at higher pressures of the termolecular recombination reaction forming HO2. The observed result is that the actual induction time rather than being inversely proportional to pressure, as it is above 1100K, varies directly with pressure and can be much less at 1 atm than at 5 atm. (Author)
AD-646 559 HC$3.00 MF$0.65

EFFECT OF INORGANIC SALTS ON PYROLYSIS OF WOOD, ALPHA-CELLULOSE, AND LIGNIN DETERMINED BY DYNAMIC THERMOGRAVIMETRY.
Forest Products Lab., Madison, Wis.
For primary bibliographic entry see Field 11L.
AD-646 562 HC$3.00 MF$0.65

ANALYTICAL STUDY OF SHOCK TUNNEL SIMULATION OF COMBUSTOR ENTRANCE CONDITIONS,
Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 21E.
AD-646 599 HC$3.00 MF$0.65

RESEARCH ON THE DEFLAGRATION OF HIGH-ENERGY SOLID OXIDIZERS.
Atlantic Research Corp., Alexandria, Va. Kinetics and Combustion Group.
For primary bibliographic entry see Field 21I.
AD-646 758 HC$3.00 MF$0.65

MOLECULAR BEAM SAMPLING OF UNSTABLE SPECIES FROM HIGH PRESSURE SYSTEMS.
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 7D.
AD-646 935 HC$3.00 MF$0.65

EVALUATION OF A THIN-FILM, HEAT-FLUX PROBE FOR MEASURING GAS VELOCITIES IN AN UNSTABLE ROCKET COMBUSTOR.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
R. D. Ingebo, and F. P. Povinelli. Feb 67, 25p NASA-TM-X-1333
Contract 128-31-06-02-22

Descriptors: *Gas, *Heat flux, *Rocket combustor, *Temperature probe, *Thin film, *Velocity measurement, Apparatus, Circuit, Combustion, Combustor, Electronic, Film, Flux, Heat, High temperature, Measurement, Oscillation, Photography, Pressure, Probe, Rocket, Sensor, Static, Streak, Temperature, Thin, Transfer, Velocity.

For abstract, see STAR 05 06.
N67-16678 HC$3.00 MF$0.65

MECHANICAL ABSORPTION OF ACOUSTIC OSCILLATIONS IN SIMULATED ROCKET COMBUSTION CHAMBERS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
C. J. Morgan, and B. Phillips. Jan 67, 55p NASA-TN-D-3792
Contract 128-31-06-05-22

Descriptors: *Absorption, *Combustion chamber, *Pressure oscillation, Acoustic, Amplitude, Chamber, Combustion, Damping, Frequency, Liner, Mechanical, Oscillation, Pressure, Resonator, Rocket, Simulation, Wave.

For abstract, see STAR 05 06.
N67-16690 HC$3.00 MF$0.65

FLAME IONIZATION AND COMBUSTION INHIBITION.
Technical rept.,
AeroChem Research Labs., Inc., Princeton, N. J.
William J. Miller. Jan 67, 27p TR-1, TP-151
Contract CST-102

Descriptors: (*Flames, Gas ionization), (*Combustion, Inhibition), Methane, Alkynes, Additives, Carbon tetrachloride, Iron compounds, Metal carbonyls, Chromium compounds, Oxychlorides, Emissivity, Continuous spectrum, Particles, Mass transfer.
Identifiers: Chromyl chloride, Iron carbonyls.

The inhibition of spherically symmetrical low-pressure CH4 or C2H2/O2 diffusion flames by a variety of additives has been studied. The relative efficiencies of the compounds studied have been found to be very nearly the same as in 1-atm flames. A detailed examination of the effects of CCl4, Fe (CO)5, and CrO2Cl2 upon ion content and emission spectra was made and the results interpreted in terms of previously postulated correlations between the ability of a given compound to reduce electron concentrations and its effectiveness as a flame inhibitor. No such correlation was found to exist and it was concluded that for these flames no causal relationship exists between the two phenomena. The relatively large inhibition efficiencies of Fe (CO)5 and CrO2Cl2 are attributed to in situ ultrafine particle formation downstream of the flame front and their subsequent diffusion into the reaction zone. The formation of these particles is indicated by ion profiles of nucleating species; the presence of the particles in the reaction zones of inhibited flames is further evidenced by the emission of continuum radiation. The dominance of diffusional over convective mass transport is the characteristic of the system which accounts for its susceptibility to inhibition by these compounds. (Author)
PB-173 993 HC$3.00 MF$0.65

21C. ELECTRIC PROPULSION

POWER ADDITION AND EXTRACTION FROM GAS FLOW BY MEANS OF ELECTRIC WIND.
Technical rept.,
Jet Propulsion Lab., Pasadena, Calif.
Meredith C. Gourdine. 1 Jun 60, 10p TR-32-18
AD-240 805
Contract NASw-6

Descriptors: (*Plasma engines, Feasibility studies), Gas flow, Plasma generators, Gas ionization, Power, Electric fields, Space charges, Voltage.

Progress on a theoretical study of the feasibility of adding or extracting power to or from a flowing gas is reported. The gas carries an excess positive charge and interacts with a strong electric field due to the space charge and/or an applied voltage. (Author)
N65-84242 HC$3.00 MF$0.65

PROJECT TUBEFLIGHT. PHASE I. FEASIBILITY STUDY.
Rensselaer Polytechnic Inst., Troy, N. Y.
For primary bibliographic entry see Field 13F.
PB-174 085 HC$3.00 MF$0.65

21D. FUELS

IGNITION OF A STOICHIOMETRIC MIXTURE IN A LAMINAR SUPERSONIC BOUNDARY LAYER OF A FLAT PLATE,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 21B.
AD-646 426 HC$3.00 MF$0.65

THERMAL STABILITY OF TEN JP-6 FUELS AFTER 1-YEAR STORAGE.
Rept. for Sep 64-Nov 65,
Monsanto Research Corp., Dayton, Ohio.
William G. Scribner, and Herbert R. Lander, Jr.
Aug 66, 34p
AFAPL-TR-66-66
Contract AF 33 (615)-1317

Descriptors: (*Jet engine fuels, Thermal stability), Storage, Contamination, Degradation, Test equipment, Chemical analysis, Microanalysis, Fuel additives, Impurities.
Identifiers: JP-6 fuels.

After 1 year of storage at ambient temperatures, only one JP-6 fuel out of ten gave any indication of a loss in thermal stability during storage. The helium-drive modified standard coker was used for evaluating the 1-year storage behavior. Various chemical tests, which were performed on the test fuels both before and after storage, gave no indications of gross contamination. In the absence of contamination and if a reliable test is used to evaluate thermal stability, no serious problem exists regarding the storage of high quality JP-6 type jet fuels. (Author)
AD-646 440 HC$3.00 MF$0.65

PHYSICAL BASES OF ROCKET WEAPONRY,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 19G.
AD-646 517 HC$3.00 MF$0.65

EFFECT OF SULFUR IN JP-5 FUEL ON HOT CORROSION OF COATED SUPERALLOYS IN MARINE ENVIRONMENT.
Phillips Petroleum Co., Bartlesville, Okla. Research Div.
For primary bibliographic entry see Field 11F.
AD-646 810 HC$3.00 MF$0.65

PROCESS DESIGN AND COST ESTIMATE FOR PRODUCTION OF 266 MILLION SCF/DAY OF PIPELINE GAS BY THE HYDROGASIFICATION OF BITUMINOUS COAL--HYDROGEN BY THE STEAM-IRON PROCESS,
Institute of Gas Technology, Chicago, Ill.
C. L. Tsaros, S. J. Knabel, and L. A. Sheridan.
Aug 66, 44p
Contract DI-14-01-0001-381

Descriptors: (*Coal gas, Industrial production), Costs, Coal, Processing, Steam, Iron, Hydrogen, Manufacturing methods, Design, Industrial equipment.

The report presents a process design and cost estimate of a plant for the production of pipeline gas by hydrogasification of pretreated coal. The process design is based on further development of the IGT hydrogasification process using the steam-iron process for hydrogen manufacture and a new hydrogasifier design based on pilot plant fluidized-bed operation. The coal feed to the plant is a Pittsburgh seam high-volatile-content bituminous coal. Product gas composition is: 90.6% methane, 7.1% hydrogen, the balance carbon oxides and nitrogen. The heating value (dry) is 940.6 Btu/SCF. The specific gravity is 0.53. Plant capacity is 266 million SCF/day, requiring 17,791 tons/day of coal.
PB-174 064 HC$3.00 MF$0.65

21E. JET AND GAS TURBINE ENGINES

RAMJET TECHNOLOGY, MATERIALS FOR RAMJET ENGINES AND COMPONENTS,
TRW Space Technology Labs., Los Angeles, Calif.
C. W. Besserer. Dec 58, 68p
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab. Report no. TG-370-14.

Descriptors: (*Ramjet engines, Materials), Combustion, Diffusers, Alloys, Metals, Mechanical properties, Refractory materials, Temperature, Physical properties, Aircraft, Airframes, Guided missiles, Heat-resistant metals + alloys, Ramjet engine nozzles, Combustion chambers.

A study was made of materials for ramjet engines and components. The problem was divided into two areas: (1) an evaluation of the mechanical properties of conventional aircraft and missile materials when used for more severe boundary conditions, and (2) a search for new materials which can be used in areas in which conventional materials are inadequate. (Author)
AD-254 759 HC$3.00

ANALYTICAL STUDY OF SHOCK TUNNEL SIMULATION OF COMBUSTOR ENTRANCE CONDITIONS,
Master's thesis,
Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
Harold F. Chambers, Jr. Oct 66, 40p AFAPL-TR-66-82

Descriptors: (*Supersonic combustion, Simulation), (*Supersonic combustion ramjet engines, Model tests), Wind tunnels, Nozzles, Engine air systems components, Shock tubes, Mathematical analysis.

In order to study the simulation capability of the shock tunnel, a set of combustor entrance conditions was generated from a 10-degree, two-shock wedge inlet and a trajectory of 1250 psf. These were compared with shock tunnel calculations for a 15-degree half-angle conical nozzle, a 5-degree half-angle conical nozzle, and a 5-degree 2-dimensional nozzle. The matching of pressure, temperature, velocity, and composition was studied. The composition deviation in the shock-tunnel nozzle was examined for its effect on hydrogen combustion ignition delay time. (Author)
AD-646 599 HC$3.00 MF$0.65

COMPARISON OF THREE THEORIES OF WATER-JET PROPULSION.
Technical memo.,
Navy Marine Engineering Lab., Annapolis, Md.
John H. Garrett. Feb 67, 52p MEL-TM-484/66

Descriptors: (*Jet propulsion, Water), Performance (Engineering), Velocity, Thrust, Power, Efficiency, Weight, Drag, Optimization, Marine propulsion, Hydrofoil boats, Cavitation, Theory.

The three different approaches to derivation of formulae expressing the relations among speed, thrust, power, and efficiency of water-jet propulsion systems, as developed by Lockheed California Company; Virgil Johnson of Hydronautics, Incorporated; and Joseph Levy of Aerojet-General Corporation, are summarized and compared. Certain modifications and simplifications are incorporated, and terminology is modified as necessary to facilitate comparison. The Lockheed system, which provides a method for including the weight and drag of the propulsion system in the optimization procedure, appears to be the more useful. The problems of compromising the performance of the propulsion system at cruising speed in order to provide reasonable hump performance are briefly discussed. (Author)
AD-646 635 HC$3.00 MF$0.65

EFFECT OF SULFUR IN JP-5 FUEL ON HOT CORROSION OF COATED SUPERALLOYS IN MARINE ENVIRONMENT.
Phillips Petroleum Co., Bartlesville, Okla. Research Div.
For primary bibliographic entry see Field 11F.
AD-646 810 HC$3.00 MF$0.65

21F. NUCLEAR PROPULSION

FINAL SNAPSHOT PERFORMANCE REPORT,
Atomics International, Canoga Park, Calif.
G. E. Berg. 15 Aug 66, 289p
Contract AT(11-1)-GEN-8

Descriptors: (*Auxiliary power plants, Thermoelectricity), (*Nuclear propulsion, Spacecraft), Power reactors, Nuclear power plants, Reactor start-up sources, Energy conversion.

For abstract, see NSA 21 04.
NAA-SR-11934 HC$3.00 MF$0.65

THEORETICAL INVESTIGATION OF RADIANT HEAT TRANSFER IN THE FUEL REGION OF A GASEOUS NUCLEAR ROCKET ENGINE.
United Aircraft Corp., East Hartford, Conn.
A. S. Kesten, and N. L. Krascella. Jan 67, 32p NASA-CR-695
Contract NASW-847

Descriptors: *Nuclear fuel, *Opacity, *Rocket engine, *Temperature distribution, Distribution, Effect, Energy, Engine, Fuel, Gaseous, Ionization, Nuclear, Potential, Radiation, Reactor, Rocket, Temperature, Thermal.

For abstract, see STAR 05 06.
N67-16013 HC$3.00 MF$0.65

THEORETICAL INVESTIGATION OF THE ABSORPTIVE PROPERTIES OF SMALL PARTICLES AND HEAVY-ATOM GASES.
United Aircraft Corp., East Hartford, Conn.
For primary bibliographic entry see Field 20H.
For abstract, see STAR 05 06.
N67-16501 HC$3.00 MF$0.65

21H. ROCKET MOTORS AND ENGINES

PHYSICAL BASES OF ROCKET WEAPONRY,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 19G.
AD-646 517 HC$3.00 MF$0.65

HIGH VISCOSITY THERMAL PROTECTION MATERIALS.
Naval Ordnance Lab., White Oak, Md.
For primary bibliographic entry see Field 11B.
AD-646 616 HC$3.00 MF$0.65

DESIGN, DEVELOPMENT, FABRICATION, TEST AND DELIVERY OF ELECTROTHERMAL ENGINE SYSTEMS SEMIANNUAL REPORT, DEC. 1965 - JUN. 1966.
Avco Corp., Wilmington, Mass. Space and Electronics Group.
R. R. John. Dec 66, 110p NASA-CR-72104, AVSSD-0362-66-CR
Contract NAS3-7934

Descriptors: *Attitude control, *Electrothermal engine, *Propulsion system, *Resistojet engine, *Satellite control, *Thrustor, Ammonia, Attitude, Axis, Conditioning, Control, Electronic, Electrothermal, Engine, Fabrication, Feed, Fuel, Hardware, Light, Logic, Module, Power, Propellant, Propulsion, Resistojet, Satellite, Signal, Source, Storage, System, Three.

For abstract, see STAR 05 06.
N67-15677 HC$3.00 MF$0.65

S- BAND LABORATORY TEST EQUIPMENT FINAL REPORT.
Avco Corp., Wilmington, Mass. Space and Electronics Group.
R. R. John. Dec 66, 27p NASA-CR-72123, AVSSD-0356-66-CR, SUPPL. 1
Contract NAS3-5908

Descriptors: *Attitude control, *Electrothermal engine, *Inversion, *Resistojet engine, *Spacecraft maneuver, *Thrustor, Ammonia, Attitude, Component, Conditioning, Control, Design, Electrothermal, Engine, Feed, Fuel, Gas, Maneuver, Performance, Power, Propellant, Regulation, Resistojet, Satellite, Signal, Spacecraft, Storage, Subsystem.

For abstract, see STAR 05 06.
N67-15678 HC$3.00 MF$0.65

NON-CHEMICAL SPACE PROPULSION.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
J. C. Evvard. 1967, 9p
Presented At The Conf. On Non-chem. Propulsion, Washington, 12 Jan. 1967, Sponsored By Aiaa And Catholic Univ. Of Am.

Descriptors: *Propulsion system, *Space mission, *Spacecraft propulsion, Chemical, Colony, Core, Electric, Feasibility, Gas, Hybrid, Mission, Nuclear, Payload, Planetary, Propulsion, Requirement, Rocket, Solar, Space, Spacecraft, System.

For abstract, see STAR 05 06.
N67-16047 HC$3.00 MF$0.65

SECONDARY FLOW RATES IN A VERTICAL DIFFUSER OF DECREASING LENGTH USING A ROCKET EXHAUST JET AS THE MOTIVE FLUID.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
J. Z. Adamson. 1 Dec 66, 18p NASA-TM-X-53543

Descriptors: *Compressor, *Diffuser, *Rocket exhaust, *Secondary flow, *Water flow, Duct, Exhaust, Flow, Gas, Jet, Length, Lox, Mass, Model, Performance, Pressure, Ratio, Rocket, Secondary, Temperature, Variation, Vertical, Water.

For abstract, see STAR 05 06.
N67-16050 HC$3.00 MF$0.65

ADVANCED PRESSURIZATION SYSTEMS FOR CRYOGENIC PROPELLANTS FINAL REPORT, 20 NOV. 1963 - 25 JUN. 1965.
Martin Co., Denver, Colo.
J. E. Anderson, H. F. Brady, and O. L. Scott. Jan 67. 298p NASA-CR-54467, CR-65-75
Contract NAS3-2574

Descriptors: *Apollo spacecraft, *Cryogenic propellant, *Fuel tank pressurization system, Cryogenic, Feed, Fuel, Hydrogen, Liquid, Module, Optimization, Oxygen, Pressurization, Propellant, Pump, Rocket engine, Service, Space vehicle, System, Tank.

For abstract, see STAR 05 06.
N67-16605 HC$3.00 MF$0.65

EVALUATION OF A THIN-FILM, HEAT-FLUX PROBE FOR MEASURING GAS VELOCITIES IN AN UNSTABLE ROCKET COMBUSTOR.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 21B.
For abstract, see STAR 05 06.
N67-16678 HC$3.00 MF$0.65

MECHANICAL ABSORPTION OF ACOUSTIC OSCILLATIONS IN SIMULATED ROCKET COMBUSTION CHAMBERS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 21B.
For abstract, see STAR 05 06.
N67-16690 HC$3.00 MF$0.65

21I. ROCKET PROPELLANTS

FUELS FOR ROCKET ENGINES (CHAPTER V),
Foreign Technology Div., Wright-Patterson AFB, Ohio.
P. T. Egorov. 8 Aug 66, 16p FTD-MT-64-56 TT-67-60778
Edited machine trans. of mono. Reaktivnoe Oruzhie, Moscow, 1960 p84-93.

Descriptors: (*Rocket propellants, Reviews), (*Liquid rocket fuels, Reviews), (*Solid rocket fuels, Reviews), Classification, Solid rocket propellants, Solid rocket oxidizers, Nitroglycerin, Rocket propellant grains, Perchlorates, Cryogenic propellants, Oxygen, Nitric acid, Hydrogen peroxide, Air-breathing engines (Unconventional), USSR.

Contents: Classification of fuels for rocket engines; Solid fuels; Liquid fuels (Requirements for liquid fuels, Propellants for liquid-fuel rocket engines, Propellants based on liquid oxygen, Propellenats based on nitric acid, Propellants based on hydrogen peroxide, Propellants for air-breathing jet engines); Other forms of propellants.
AD-646 421 HC$3.00 MF$0.65

PHYSICAL BASES OF ROCKET WEAPONRY,
Foreign Technology Div., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 19G.
AD-646 517 HC$3.00 MF$0.65

RESEARCH ON THE DEFLAGRATION OF HIGH-ENERGY SOLID OXIDIZERS.
Quarterly technical summary rept. no. 4, 1 Sep-30 Nov 66,
Atlantic Research Corp., Alexandria, Va. Kinetics and Combustion Group.
G. von Elbe, J. B. Levy, R. Friedman, and E. T. McHale. 30 Dec 66, 13p
AFOSR-67-0382
Contract AF 49 (638)-1645
See also AD-642 420.

Descriptors: (*Solid rocket oxidizers, *Deflagration), (*Ammonium perchlorate, Solid rocket oxidizers), Test equipment, Hydroxides, Control systems.
Identifiers: Hydroxylammonium perchlorate.

Work was initiated on the study of the self-deflagration of hydroxylammonium perchlorate (HAP), and the investigation of solid-oxidizer and propellent extinguishment. The effort to present has principally been devoted to design and construction of apparatus, preliminary calculations and acquiring and analyzing HAP. Progress along these lines is outlined. (Author)
AD-646 758 HC$3.00 MF$0.65

ADVANCED OXIDIZER CHEMISTRY.
IIT Research Inst., Chicago, Ill. Technology Center.
For primary bibliographic entry see Field 7D.
AD-646 779 HC$3.00 MF$0.65

SLUSH HYDROGEN PRODUCTION, STORAGE, AND DISTRIBUTION STUDY PROGRAM FINAL REPORT, 4 NOV. 1965 - 29 APR. 1966.
Union Carbide Corp., Tonawanda, N. Y. Linde Div.
13 May 66, 97p NASA-CR-81185
Contract SNPC-41

Descriptors: *Liquid hydrogen, *Nuclear propulsion, *Slush, Cost, Cycle, Helium, Hydrogen, Liquid, Nerva, Nuclear, Plant, Propulsion, Pump, Recirculation, Refrigeration, Storage, Vacuum, Vapor.

For abstract, see STAR 05 06.
N67-15455 HC$3.00 MF$0.65

OUTGASSING RATES OF TWO SOLID ROCKET FUELS IN VACUUM.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
L. R. Greenwood. Jan 67, 35p NASA-TN-D-3790
Contract 124-09-04-01-23

Descriptors: *Composite propellant, *Propellant storage, Acid, Acrylic, Binder, Composite, Fuel, Measurement, Outgassing, Polybutadiene, Polyurethane, Propellant, Rate, Rocket, Rubber, Solid, Storage, Synthetic.

For abstract, see STAR 05 06.
N67-15959 HC$3.00 MF$0.65

STORAGE TESTS OF NITROGEN TETROXIDE AND HYDRAZINE IN ALUMINUM CONTAINERS.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
L. P. Hollywood, T. R. Metz, and R. N. Porter. 15 Jan 67, 27p NASA-CR-81294, JPL-TR-32-1039
Contract NAS7-100

Descriptors: *Aluminum alloy, *Hydrazine, *Nitrogen oxide, *Storage tank, Alloy, Aluminum, Cleaning, Combustion, Fuel, Ignition, Nitrogen, Oxide, Performance, Storage, Tank.

For abstract, see STAR 05 06.
N67-16559 HC$3.00 MF$0.65

22. SPACE TECHNOLOGY

22A. ASTRONAUTICS

PROGRAM 631A. VOLUME VI. EXPERIMENT D 8: RADIATION IN SPACECRAFT.
Technical rept.,
Air Force Weapons Lab., Kirtland AFB, N. Mex.
Marion F. Schneider, Joseph F. Janni, and B. Brentnall. May 66, 272p
SSD-TR-66-115
Prepared in cooperation with Space Systems Div., Houston Tex. Det. 2, MSC.

Descriptors: (*Manned spacecraft, *Dosimeters), Radiobiology, Space environmental conditions, Shielding, Van Allen radiation belt, Cosmic rays, Solar flares, Radiation effects, Space flight.
Identifiers: GEMINI.

This document describes in technical detail the Air Force Radiation Experiment D8, carried out as a part of the 631A Program on the NASA Gemini flights. This experiment was concerned with gathering dose data and developing techniques furthering the art of manned spacecraft radiation dosimetry systems. Information from D8 should be of significant value in insuring manned mission safety and success in the future. From this effort new and highly sophisticated space-flight-worthy radiac systems have evolved. Their versatility in manned space operations was demonstrated for the first time on Gemini IV. D8 was the initial effort to place a complete dosimetry system onboard a manned spacecraft. This radiation experiment consisted of the latest available passive devices complimentary to (and correlated with) active ionization chambers giving instantaneous dose data. The information gathered in this experiment has been used to perform vital empirical checks on existing computational techniques and is presently providing corrections for application to theoretical prediction capabilities for radiation hazards associated with future manned spaceflights.
AD-646 555 HC$3.00 MF$0.65

EXTRAVEHICULAR SPACE ADHESIVE SYSTEM.
Final technical rept. Apr 65-Mar 66,
National Cash Register Co., Dayton, Ohio.
G. Peters, J. Whitaker, and J. Hanny. Aug 66, 59p
AFAPL-TR-66-59
Contract AF 33 (615)-2693

Descriptors: (*Adhesives, *Space maintenance), (*Extravehicular activity, Mooring), Astronautics, Feasibility studies, Stabilization, Encapsulation, Epoxy plastics, Acrylic resins, Catalysts, Astronauts, Spacecraft, Surfaces, Bonding.
Identifiers: Polycyanoacrylates.

The purpose of this program was to demonstrate the feasibility of developing and incorporating capsular adhesives formulations into an extravehicular astronaut attachment device for stabilization of the astronaut during EVA maintenance or repair missions. Program investigations involved the screening and evaluation of numerous rapid-curing adhesive formulations, encapsulation of adhesive components, testing of capsular adhesive systems, and the design and fabrication of adhesive pads and dispensers. Two potential adhesive systems were selected during the screening studies. These were the Eastman '910' (methyl 2-cyanoacrylate) catalyzed with dimethyl p-toluidine, and epoxy resins catalyzed with BF3 complexes. All of the selected adhesive components were encapsulated and formulated into functional capsular adhesive systems. Because of certain inherent mixing problems which were related to the epoxy resins and the selected cure-inducing catalysts, the majority of work was directed toward the 'Eastman 910' adhesive formulation. Test data obtained in regard to the capsular 'Eastman 910' adhesive formulation indicated the system satisfied the majority of program design goals. (Author)
AD-646 659 HC$3.00 MF$0.65

EXOTHERMIC SPACE BONDING SYSTEM.
Final technical rept. 1 Jun 65-28 Feb 66,
Whittaker Corp., San Diego, Calif. Narmco Re-

search and Development Div.
Rodney A. Jones, and Glenn H. Sievert. Aug 66, 65p
AFAPL-TR-66-63
Contract AF 33 (615)-2814

Descriptors: (*Space maintenance, *Bonding), (*Extravehicular activity, Mooring), Spacecraft, Surfaces, Adhesives, Aluminum, Disks, Heating, Thermoplastics, Astronautics, Stabilization, Feasibility studies.

The report covers the development of a system, including materials, design, and techniques, for attaching adhesive pads to the exterior surface of spacecraft. The purpose of these pads is to provide attachment points for astronauts and their equipment while carrying out maintenance and repair functions in space. The pads consist of aluminum disks of 1-1/4 in. diameter and 0.050-in. thickness with a fastening stud on one surface and a layer of thermoplastic adhesive on the other surface. A thermal pulse to soften the adhesive and produce bonding under light pressure is obtained from the reaction of a small exotherm charge, which is enclosed in an insulative housing on the back or stud-side of the pad. Vacuum bonding experiments at approximately 0.000001 Torr plus the results of bond strength tests over the range from -100F to 250F are described. Adhesive bond strengths of nearly 900 psi at room temperature were obtained on aluminum skin specimens. Design strength objectives of more than 100 psi were achieved over the entire temperature range. Also described is the development and test of an exotherm heating unit for preheating spacecraft structure skins before pad bonding to improve adhesion and operational flexibility. Vacuum exposure tests on organic adhesive bonded specimens indicate suitability for extended use without degradation of adhesive strength. (Author)
AD-646 670 HC$3.00 MF$0.65

APERTURE SIZES AND DEPTHS OF REACH FOR ONE- AND TWO-HANDED TASKS.
Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 5E.
AD-646 716 HC$3.00 MF$0.65

MOTION OF AN ARTIFICIAL SATELLITE ABOUT ITS CENTER OF MASS.
Israel Program for Scientific Translations, Ltd., Jerusalem.
V. V. Beletskii. 1966, 272p NASA-TT-F-429, TT-67-51366
Transl. Into English Of The Book "dvizhenie Iskusstvennogo Sputnika Otnositel No Tsentra Mass" Moscow, Izd. Nauka, 1965 Published For Nasa And Nsf

Descriptors: *Aerodynamic characteristics, *Spacecraft motion, Aerodynamic, Artificial, Bibliography, Characteristics, Drag, Evolution, Insolation, Instrumentation, Motion, Orbit, Perturbation, Rotation, Satellite, Spacecraft, Torque, Translation.

For abstract, see STAR 05 06.
N67-15429 HC$3.00 MF$0.65

SPACE PROGRAMS SUMMARY NO. 37-41, VOLUME IV FOR THE PERIOD AUGUST 1 TO SEPTEMBER 30, 1966. SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
31 Oct 66, 341p NASA-CR-81201, JPL-SPS-37-41, VOL. IV
Contract NAS7-100

Descriptors: *Engineering development, *Environment simulation, *Guidance and control, *Space science, *Spacecraft propulsion, *Systems analysis, *Telecommunication, Capsule, Development, Engineering, Environment, Program, Propulsion, Research, Science, Simulation, Space, Spacecraft, Summary, System, Venus.

For abstract, see STAR 05 06.
N67-15701 HC$3.00 MF$0.65

OGO PROGRAM - BIBLIOGRAPHY.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
G. H. Ludwig. 30 Sep 66, 84p NASA-CR-81210
Its Issue 66-1

Descriptors: *Abstract, *Bibliography, *Ogo, Design, Experiment, Geophysics, Laboratory, Pogo, Space, Spacecraft.

For abstract, see STAR 05 06.
N67-15846 HC$3.00 MF$0.65

SPACE PROGRAMS SUMMARY NO. 37-42, VOLUME III FOR THE PERIOD SEPTEMBER 1, 1966 TO OCTOBER 31, 1966. DEEP SPACE NETWORK.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
For primary bibliographic entry see Field 9F.
For abstract, see STAR 05 06.
N67-15901 HC$3.00 MF$0.65

MANNED SPACE-FLIGHT EXPERIMENTS, GEMINI IX MISSION INTERIM REPORT.
National Aeronautics and Space Administration, Washington, D. C.
1 Nov 66, 143p NASA-TM-X-59315

Descriptors: *Experiment design, *Extravehicular operation, *Gemini spacecraft, *Ionospheric electron density, *Micrometeorite, *Space photography, Agena rocket, Airglow, Astronaut, Backpack, Bioassay, Biological, Body, Collector, Density, Design, Electron, Experiment, Faraday rotation, Fluid, Frequency, Ionospheric, Light, Photography, Physiology, Polarization, Space, Ultrahigh, Very high, Zodiac.

For abstract, see STAR 05 06.
N67-16021 HC$3.00 MF$0.65

THE EFFECT OF THE SPACE ENVIRONMENT ON LUBRICANTS AND ROLLING ELEMENT BEARINGS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 13I.
For abstract, see STAR 05 06.
N67-16048 HC$3.00 MF$0.65

PUBLICATIONS OF THE JET PROPULSION LABORATORY JULY 1965 THROUGH JULY 1966.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
R. L. Woods. 15 Dec 66, 87p NASA-CR-81253, JPL-BIBL-39-7
Contract NAS7-100

Descriptors: *Astronautics, *Bibliography, *Space program, Annotation, Index, Information, Jet propulsion, Literature, Numerical, Program, Report, Search, Space, Subject.

For abstract, see STAR 05 06.
N67-16056 HC$3.00 MF$0.65

ESTIMATION OF PLANETARY CONTAMINATION PROBABILITIES DUE TO FLIGHT OF THE U. S. S. R. VENUS 3.
Exotech, Inc., Washington, D. C.
S. Schalkowsky. 10 Aug 66, 14p NASA-CR-81256
Contract NASW-1340

Descriptors: *Contamination, *Planetary exploration, *Venus probe, Biological, Estimate, Exploration, Impact, Mars (planet), Planetary, Probability, Probe, U.S.S.R., Venus.

For abstract, see STAR 05 06.
N67-16512 HC$3.00 MF$0.65

REMARKS ON THE INTERPRETATION OF LUNIK 10 MAGNETOMETER RESULTS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
N. F. Ness. Jan 67, 16p NASA-TM-X-55650, X-612-67-9
Submitted For Publication

Descriptors: *Explorer xxxiii satellite, *Geomagnetism, *Imp-c, *Lunar probe, *Satellite measurement, Data, Interpretation, Lunar, Magnetic, Magnetometer, Measurement, Moon, Position, Probe, Satellite, Tail.

For abstract, see STAR 05 06.
N67-16551 HC$3.00 MF$0.65

SPACE PROGRAMS SUMMARY NO. 37-42, VOLUME VI FOR THE PERIOD SEPTEMBER 1 TO OCTOBER 31, 1966. SPACE EXPLORATION PROGRAMS AND SPACE SCIENCES.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
30 Nov 66, 30p NASA-CR-81293, JPL-SPS-37-42, VOL. VI
Contract NAS7-100

Descriptors: *Deep space instrumentation facility (dsif), *Mariner space probe, *Surveyor project, *Voyager project, Communication, Deep space, Design, Development, Dsif, Engineering, Equipment, Facility, Ground, Instrumentation, Interplanetary, Lunar, Mission, Network, Operation, Probe, Program, Space, System.

For abstract, see STAR 05 06.
N67-16561 HC$3.00 MF$0.65

STUDY OF THE AUTOMATED BIOLOGICAL LABORATORY PROJECT DEFINITION VOLUME I - SUMMARY FINAL REPORT, 10 AUG. 1964 - 10 AUG. 1965.
Aeronutronic, Newport Beach, Calif.
T. W. Neumann. 10 Sep 65, 61p NASA-CR-81309, U-3237, VOL. I
Contract NASW-1065

Descriptors: *Automatic data processing system, *Biology, *Extraterrestrial life, *Mars probe, *Planetary exploration, *Space laboratory, *Systems engineering, Automatic, Data, Definition, Exploration, Extraterrestrial, Laboratory, Life, Mars, Objective, Payload, Probe, Processing, Satellite, Space, System.

For abstract, see STAR 05 06.
N67-16575 HC$3.00 MF$0.65

STUDY OF THE AUTOMATED BIOLOGICAL LABORATORY PROJECT DEFINITION. VOLUME II - SCIENTIFIC PAYLOAD DEFINITION STUDIES FINAL REPORT, 10 AUG. 1964 - 10 AUG. 1965.
Aeronutronic, Newport Beach, Calif.
T. W. Neumann. 10 Sep 65, 146p NASA-CR-81310, U-3237, VOL. II
Contract NASW-1065

Descriptors: *Biology, *Extraterrestrial life, *Mars probe, *Payload, *Scientific satellite, *Space laboratory, Automatic, Definition, Environment, Experiment, Exploration, Extraterrestrial, Laboratory, Life, Mars, Planetary, Probe, Satellite, Space.

For abstract, see STAR 05 06.
N67-16576 HC$3.00 MF$0.65

STUDY OF THE AUTOMATED BIOLIOGICAL LABORATORY PROJECT DEFINITION. VOLUME III - SYSTEM ENGINEERING STUDIES FINAL REPORT, 10 AUG. 1964 - 10 AUG. 1965.
Aeronutronic, Newport Beach, Calif.
T. W. Neumann. 10 Sep 65, 627p NASA-CR-81307, U-3237, VOL. III
Contract NASW-1065

Descriptors: *Biology, *Extraterrestrial life, *Mars probe, *Planetary exploration, *Space laboratory, *Systems engineering, Automatic, Design, Engineering, Exploration, Extraterrestrial, Interface, Laboratory, Landing, Life, Payload, Planetary, Probe, Science, Selection, Site, Space, Study, Subsystem, Support, System.

For abstract, see STAR 05 06.
N67-16577 HC$3.00 MF$0.65

STUDY OF THE AUTOMATED BIOLOGICAL LABORATORY PROJECT DEFINITION. VOLUME IV - PROGRAM PLAN FINAL REPORT, 10 AUG. 1964 - 10 AUG. 1965.
Aeronutronic, Newport Beach, Calif.
T. W. Neumann. 10 Sep 65, 67p NASA-CR-81312, U-3237, VOL. IV
Contract NASW-1065

Descriptors: *Biology, *Extraterrestrial life, *Management planning, *Mars probe, *Planetary exploration, *Scheduling, *Space laboratory, Activity, Automatic, Cost, Exploration, Extraterrestrial, Interaction, Laboratory, Life, Management, Plan, Planetary, Planning, Program, Space.

For abstract, see STAR 05 06.
N67-16578 HC$3.00 MF$0.65

STUDY OF THE AUTOMATED BIOLOGICAL LABORATORY PROJECT DEFINITION. VOLUME V - EXOBIOLOGY BIBLIOGRAPHY FINAL REPORT, 10 AUG. 1964 - 10 AUG. 1965.
Aeronutronic, Newport Beach, Calif.
T. W. Neumann. 10 Sep 65, 158p NASA-CR-81311, U-3237, VOL. V
Contract NASW-1065

Descriptors: *Bibliography, *Biology, *Extraterrestrial life, *Planetary exploration, *Space laboratory, Analysis, Annotation, Application, Chromatography, Computer, Detection, Device, Exobiology, Exploration, Extraterrestrial, Gas, Instrumentation, Laboratory, Life, Mars, Mass, Planetary, Probe, Space, Spectrometry.

For abstract, see STAR 05 06.
N67-16579 HC$3.00 MF$0.65

STUDY OF THE AUTOMATED BIOLOGICAL LABORATORY PROJECT DEFINITION. VOLUME VI - TECHNICAL APPENDICES. PART 1 FINAL REPORT, 10 AUG. 1964 - 10 AUG. 1965.
Aeronutronic, Newport Beach, Calif.
T. W. Neumann. 10 Sep 65, 382p NASA-CR-81308, U-3237
Contract NASW-1065

Descriptors: *Biology, *Extraterrestrial life, *Planetary exploration, *Space laboratory, Analysis, Automatic, Chemical, Detection, Environment, Experiment, Exploration, Extraterrestrial, Instrument, Laboratory, Life, Planetary, Space, Survey, Technique.

For abstract, see STAR 05 06.
N67-16580 HC$3.00 MF$0.65

22B. SPACECRAFT

FLAT CONDUCTOR CABLE MANUFACTURE AND INSTALLATION TECHNIQUES,
National Aeronautics and Space Administration, Huntsville, Ala. George C. Marshall Space Flight Center.
For primary bibliographic entry see Field 9A.
AD-646 533 HC$3.00 MF$0.65

NUMERICAL INTERPRETATION OF CLOUD INFORMATION FROM METEOROLOGICAL SATELLITES.
American Meteorological Society, Boston, Mass.
For primary bibliographic entry see Field 4B.
AD-646 617 HC$3.00 MF$0.65

AN APPLICATION OF METHODS OF FUNCTION MINIMISATION TO A PROBLEM OF NON-LINEAR CURVE FITTING ARISING IN THE ESTIMATION OF GEOPHYSICAL CONSTANTS FROM SATELLITE OBSERVATIONS.
Royal Aircraft Establishment, Farnborough (England).
For primary bibliographic entry see Field 8E.
AD-646 640 HC$3.00 MF$0.65

A DESCRIPTION OF THE NAVAL WEAPONS LABORATORY SATELLITE GEODESY SYSTEMS.
Technical memo.
Naval Weapons Lab., Dahlgren, Va.
Jan 67, 124p NWL-TM-K-6/67

Descriptors: (*Satellite networks, Naval research), (*Scientific satellites, Geodesics), (*Astronomical geodesics, Satellite networks), Computer programs, Orbital trajectories, Mathematical analysis, Least squares method, Matrix algebra, Integration, Doppler systems, Tracking, Optical tracking, Satellite tracking systems, Data processing systems.

Artificial near-earth satellites are prolific sources of geodetic information-data about the size and shape of the earth and its gravitation field. The Naval Weapons Laboratory, through the Satellite Geophysics Program, has been involved in satellite orbit determination and geodesy since 1960. This report provides an over-view description of the NWL Satellite Geophysics Program, its functions, operations, and computer programs. Pertinent billets for the Astronautics Division (KA) of the Computation and Analysis Laboratory (K-Lab) are described. (Author)
AD-646 731 HC$3.00 MF$0.65

INTERNAL CONVECTION EFFECTS IN THERMAL MODELS OF SPACE VEHICLES,
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
Han M. Hsia, and Jan. A. van der Bliek. Feb 67, 22p AEDC-TR-66-257
Contract AF 40 (600)-1200
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Spacecraft, Thermal properties), (*Space simulation chambers, Thermodynamics), Model tests, Convection (Heat transfer), Solar radiation, Simulation, Numerical analysis, Gases, Scale.

The influence of gaseous convection inside a model placed in a space chamber with solar simulation was investigated by means of a numerical calculation. Thermal modeling relations were derived for a model with internal convection. (Author)
AD-646 770 HC$3.00 MF$0.65

THE ALOUETTE II SATELLITE,
Defence Research Telecommunications Establishment, Ottawa (Ontario).
G. L. Nelms, R. E. Barrington, J. S. Belrose, T. R. Hartz, and I. B. McDiarmid. 22 Mar 66, 13p
Prepared in cooperation with National Research Council of Canada, Ottawa (Ontario) and Goddard Space Flight Center, Greenbelt, Md.
Availability: Published in Canadian Journal of Physics v44 p1419-30 1966.

Descriptors: (*Scientific satellites, Launching), (*Upper atmosphere, Scientific satellites), Atmospheric sounding, Electron density, Radiofrequency interference, Whistlers, Charged particles, Probes, Van Allen radiation belt, Magnetosphere, Plasma medium, Canada.
Identifiers: Alouette.

The successful launch of the Alouette II satellite is announced. A brief description is given of the experiments on board and some early indications of the results obtained are presented. (Author)
AD-646 816 Not available from CFSTI.

RANGER VI MISSION DESCRIPTION AND PERFORMANCE.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

15 Dec 66, 84p NASA-CR-81193, JPL-TR-32-699
Contract NAS7-100

Descriptors: *Atlas agena launch vehicle, *Mission planning, *Ranger vi lunar probe, *Spacecraft performance, *System failure, Deep space instrumentation facility (dsif), Failure, Ground, Improvement, Mission, Network, Operation, Path, Performance, Planning, Spacecraft, System, Television.

For abstract, see STAR 05 06.
N67-15682 HC$3.00 MF$0.65

FAILURE RATE COMPUTATIONS BASED ON MARINER MARS 1964 SPACECRAFT DATA.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
For primary bibliographic entry see Field 9A.
For abstract, see STAR 05 06.
N67-15684 HC$3.00 MF$0.65

SPACE PROGRAMS SUMMARY NO. 37-41, VOLUME VI FOR THE PERIOD JULY 1 TO AUGUST 31, 1966. SPACE EXPLORATION PROGRAMS AND SPACE SCIENCES.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
30 Sep 66, 43p NASA-CR-81190, JPL-SPS-37-41, VOL. VI
Contract NAS7-100

Descriptors: *Deep space instrumentation facility (dsif), *Mariner space probe, *Surveyor project, *Test facility, *Voyager project, Design, Environment, Facility, Instrumentation, Mars, Mission, Operation, Performance, Quality, Reliability, System, Test, Venus.

For abstract, see STAR 05 06.
N67-15685 HC$3.00 MF$0.65

SPACE PROGRAMS SUMMARY NO. 37-40, VOLUME IV FOR THE PERIOD JUNE 1 - JULY 31, 1966. SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
31 Aug 66, 309p NASA-CR-81207, JPL-SPS-37-40, VOL. IV
Contract NAS7-100

Descriptors: *Engineering development, *Guidance and control, *Space science, *Spacecraft propulsion, *Telecommunication, Development, Engineering, Environment, Liquid, Program, Propulsion, Research, Simulation, Solid, Space, Spacecraft, Summary.

For abstract, see STAR 05 06.
N67-15781 HC$3.00 MF$0.65

FUNCTIONAL REQUIREMENTS FOR SPACE-BORNE COMPUTERS ON ADVANCED MANNED MISSIONS.
Bellcomm, Inc., Washington, D. C.
For primary bibliographic entry see Field 9B.
For abstract, see STAR 05 06.
N67-15882 HC$3.00 MF$0.65

SELF-EVACUATED MULTILAYER INSULATION OF LIGHTWEIGHT PREFABRICATED PANELS FOR CRYOGENIC SPACE PROPULSION VEHICLES.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
R. P. Dengler, L. R. Niendorf, G. E. Nies, and P. J. Perkins. 1967, 18p NASA-TM-X-52266
Presented At The 8th Struct., Structural Dyn. And Mater. Conf., Palm Springs, Calif., 29-31 Mar. 1967, Sponsored By Aiaa

Descriptors: *Cryogenic storage, *Heat shield, *Propellant tank, *Thermal insulation, Calorimetry, Carbon dioxide, Cryogenic, Cryopumping, Heat, Insulation, Lightweight, Multilayer, Mylar, Panel, Performance, Propellant, Radiation, Seal, Shield, Storage, Tank, Thermal, Vacuum.

For abstract, see STAR 05 06.
N67-16046 HC$3.00 MF$0.65

MICROBIOLOGICAL BURDEN ON THE SURFACES OF THE AIMP SPACECRAFT, PART 2.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
E. M. Powers. Jun 66, 10p NASA-TM-X-55629, X-624-66-368

Descriptors: *Interplanetary spacecraft, *Microbiology, *Spacecraft contamination, Average, Contamination, Count, Decontamination, Interplanetary, Monitor, Particle, Platform, Procedure, Reduction, Sampling, Spacecraft, Surface.

For abstract, see STAR 05 06.
N67-16051 HC$3.00 MF$0.65

MICROBIOLOGICAL BURDEN ON THE SURFACES OF THE AIMP SPACECRAFT, PART 3.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
E. M. Powers. Jul 66, 31p NASA-TM-X-55630, X-624-66-369

Descriptors: *Decontamination, *Interplanetary spacecraft, *Microbiology, *Monitor, Air, Assembly, Fallout, Interplanetary, Material, Method, Occlusion, Platform, Sampling, Spacecraft, Sterilization, Surface.

For abstract, see STAR 05 06.
N67-16052 HC$3.00 MF$0.65

MICROBIOLOGICAL BURDEN ON THE SURFACES OF THE AIMP SPACECRAFT, PART 4.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
E. M. Powers. Aug 66, 16p NASA-TM-X-55631, X-624-66-370

Descriptors: *Interplanetary spacecraft, *Spacecraft contamination, Air, Contamination, Decontamination, Fallout, Interplanetary, Ketone, Microbiology, Microorganism, Monitor, Platform, Procedure, Spacecraft, Stainless steel, Sterilization, Table.

For abstract, see STAR 05 06.
N67-16053 HC$3.00 MF$0.65

APOLLO SPACECRAFT CONTROL SYSTEMS.
National Aeronautics and Space Administration. Manned Spacecraft Center, Langley Station, Va.
R. G. Chilton. 1965, 28p NASA-TM-X-59316
Presented At The Symp. On Autom. Control In Peaceful Uses Of Space, Stavanger, Norway, 21-24 Jun. 1965

Descriptors: *Apollo spacecraft, *Attitude control, *Engine control, Attitude, Cislunar, Command, Control, Engine, Excursion, Flight, Lunar, Module, Stabilization.

For abstract, see STAR 05 06.
N67-16506 HC$3.00 MF$0.65

THE VIBRATION RESPONSE OF AN ORBITING GEOPHYSICAL OBSERVATORY SPACECRAFT FULL-SCALE STRUCTURAL MODEL TO A SIMULATED LAUNCH ACOUSTIC ENVIRONMENT.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
P. J. Alfonsi. Aug 66, 91p NASA-TM-X-55640, X-320-66-353

Descriptors: *Acoustic vibration, *Ogo, *Simulation, Acoustic, Environment, Instrumentation, Launch, Method, Model, Response, Scale, Test, Vibration.

For abstract, see STAR 05 06.
N67-16543 HC$3.00 MF$0.65

EFFECTIVENESS OF DRY HEAT AND ETHYLENE GAS UPON SPORE CONTAMINATION LOCATED BETWEEN MATED SURFACES AND ON EXTERIOR SURFACES OF VARIOUS MATERIALS.
Army Biological Labs., Fort Detrick, Md. Physical Defense Div.
For primary bibliographic entry see Field 13H.
For abstract, see STAR 05 06.
N67-16614 HC$3.00 MF$0.65

POLYMERS FOR SPACECRAFT HARDWARE - MATERIALS CHARACTERIZATION, PART I INTERIM REPORT, MAR. - DEC. 1966.
Stanford Research Inst., Menlo Park, Calif.
E. Cleland, R. Harrington, and H. Maxwell. 9 Dec 66, 144p NASA-CR-81377, IR-3, PT. I
Contracts NAS7-100, JPL-950745
Prepared For Jpl

Descriptors: *Environmental testing, *Hardware, *Polymer, *Spacecraft environment, Elastomer, Environment, Loss, Mechanical, Plastic, Property, Spacecraft, Testing, Thermal, Vacuum, Weight.

For abstract, see STAR 05 06.
N67-16695 HC$3.00 MF$0.65

22C. SPACECRAFT TRAJECTORIES AND REENTRY

ON THE EQUIVALENCE OF LINEARIZED KALMAN FILTERS.
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
For primary bibliographic entry see Field 12A.
AD-646 550 HC$3.00 MF$0.65

ATMOSPHERIC DENSITY DETERMINATION FROM LOW HEIGHT SATELLITES.
International Business Machines Corp., Cambridge, Mass. Cambridge Advanced Space Systems Dept.
For primary bibliographic entry see Field 4A.
AD-646 584 HC$3.00 MF$0.65

NECESSARY CONDITIONS FOR OPTIMAL SINGLE IMPULSE TRANSFER.
Revised ed.,
Grumman Aircraft Engineering Corp., Bethpage, N. Y.
H. Gardner Moyer. 2 May 66, 8p
AFOSR-67-0358
Contract AF 49 (638)-1512
Revision of manuscript submitted 4 Feb 66. Prepared for presentation at the AIAA Aerospace Sciences Meeting (3rd) New York, N. Y. Jan 24-26 1966.
Availability: Published in AIAA Journal v4 n8 p1405-10 1966.

Descriptors: (*Transfer trajectories, Optimization), Thrust.

The problem studied is the minimum impulse transfer of a rocket between coplanar, intersecting, Keplerian orbits. There are no restrictions on either the number of impulses, the transfer time, or the points on the orbits selected for departure and arrival. The particular objective is to find the circumstances under which the optimal transfer is accomplished by means of a single impulse. It is found that a single impulse transfer can be optimal only if the thrust direction lies either in a region within the acute angle defined by the velocity vector and the local horizontal, or in the diametrically opposite region. Curves for the limits of the magnitudes of the optimal impulses are plotted. These properties imply that the velocity vectors, before and after an optimal impulse, form an acute angle that does not straddle either the horizontal or the vertical. There are no optimal impulses on certain arcs between the apses of ellipses whose eccentricities exceed approximately 0.925. Optimal impulses on parabolas and hyperbolas are located at an infinite distance from the ceter of attraction and are of infinitesimal magnitude. Impulses at pericenter that are directly opposed to the velocity are also optimal for parabolas. (Author)
AD-646 814 Not available from CFSTI.

OPTIMIZATION PROBLEMS IN POWERED SPACE FLIGHT.
Analytical Mechanics Associates, Inc., Cambridge, Mass.
Theodore N. Edelbaum. 1965, 22p
AFOSR-67-0294
Contract AF 49 (638)-1239
Prepared for presentation at AAS/AAAS Special Astronautics Symposium on Recent Developments in Space Flight Mechanics, Berkeley, Calif., Dec 29, 1965. Research supported in part by NASA.
Availability: Published in Recent Developments in Space Flight Mechanics v9 p113-31 1966.

Descriptors: (*Orbital trajectories, Optimization), (*Transfer trajectories, Optimization), Space flight, Circular orbit trajectories, Elliptical orbit trajectories, Gravity, Thrust, Fuel consumption, Inclined orbit trajectories.

A review is presented of known solutions to some problems of space trajectory optimization. These problems are concerned with minimum fuel transfer between circular or elliptic orbits in a central gravitational field. The limiting cases of very large thrust and very small thrust are considered for transfer between the same sets of terminal orbits. Particular attention is paid to the nature of the minimizing solutions, including the occurrence of multiple minima and nonminimizing extremals. (Author)
AD-646 923 Not available from CFSTI.

RONDVU/ PRESTO - PROGRAM FOR RENDEZVOUS MISSION TRAJECTORY OPTIMIZATION.
Lockheed Missiles and Space Co., Sunnyvale, Calif.

R. L. Moll, R. C. Rosenbaum, and R. E. Willwerth, Jr.. Jan 67, 42p NASA-CR-685
Contract NAS1-5255

Descriptors: *Earth orbital rendezvous (eor), *Fortran, *Spacecraft orbital rendezvous, *Trajectory optimization, Boost, Coding, Computer, Digital, Earth, Format, Geometry, Iteration, Mission, Multistage, Nomenclature, Optimization, Optional, Orbit, Orbital, Plane, Program, Rendezvous, Sequence, Space, Spacecraft, System, Trajectory, Vehicle.

For abstract, see STAR 05 06.
N67-15667 HC$3.00 MF$0.65

ON THE LONG PERIOD PERTURBATIONS IN THE MOTION OF SMALL ECCENTRICITY SATELLITES.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
T. L. Felsentreger, and E. L. Victor. Dec 66, 41p
NASA-TM-X-55647, X-547-66-577

Descriptors: *Alouette i satellite, *Satellite perturbation, *Tiros viii satellite, *Zonal harmonics, Earth, Eccentricity, Gravity, Harmonics, Motion, Perigee, Perturbation, Satellite, Table, Zone.

For abstract, see STAR 05 06.
N67-16549 HC$3.00 MF$0.65

INFLUENCE OF DATA TYPE AND RATE ON SHORT ARC LUNAR ORBIT DETERMINATION.
TRW Systems, Redondo Beach, Calif.
E. A. Emerson, and D. J. Johnson. 1966, 48p
NASA-CR-66245
Contract NAS1-4605-7

Descriptors: *Doppler radar, *Error, *Lunar satellite, *Range and range rate tracking, *Satellite orbit, Analysis, Arc, Contour, Counting, Data, Lunar, Matrix, Model, Optimum, Orbit, Plot, Radar, Range, Rate, Satellite, Selection, Short, Statistical, Table, Tracking, Trajectory.

For abstract, see STAR 05 06.
N67-16573 HC$3.00 MF$0.65

REVIEW OF A DSIF DATA TAKING AND ORBIT DETERMINATION METHOD.
TRW Systems, Redondo Beach, Calif.
R. D. Elliot. 1966, 37p NASA-CR-66246
Contract NAS1-4605-7

Descriptors: *Deep space instrumentation facility (dsif), *Doppler radar, *Error, *Lunar satellite, *Range and range rate tracking, *Satellite orbit, Analysis, Counting, Determination, Effect, Gravity, Lunar, Orbit, Power, Radar, Range, Rate, Satellite, Source, Spectral, Tracking.

For abstract, see STAR 05 06.
N67-16574 HC$3.00 MF$0.65

A STUDY OF THE LUNAR ORBITER REGARDING ITS ADAPTABILITY TO SURFACE EXPERIMENTS UTILIZING A FLY-BY AND EARTH RETURN TRAJECTORY FINAL REPORT.
Boeing Co., Seattle, Wash. Space Div.
6 Oct 66, 118p NASA-CR-66269, D2-100690-4
Contract NAS1-6216

Descriptors: *Earth-moon trajectory, *Experiment design, *Flyby mission, *Lunar orbiter, *Lunar surface, Adaptation, Analysis, Design, Earth, Experiment, Flyby, Lunar, Mission, Moon, Orbit, Planning, Return, Surface, Trajectory.

For abstract, see STAR 05 06.
N67-16603 HC$3.00 MF$0.65

THE SHORT-PERIOD DRAG PERTURBATIONS OF THE ORBITS OF ARTIFICIAL SATELLITES.
Smithsonian Astrophysical Observatory, Cambridge, Mass.
S. B. Mills, and L. Sehnal. 3 Oct 66, 36p NASA-CR-81341, SAO SPECIAL REPT.-223
Grant NSG-87-60

Descriptors: *Orbit perturbation, *Satellite, *Satellite drag, Artificial, Atmospheric, Computation Density, Drag, Element, Function, Numerical, Orbit, Period, Perturbation, Short, Solution.

For abstract, see STAR 05 06.
N67-16617 HC$3.00 MF$0.65

ATTITUDE STABILITY OF A SPINNING PASSIVE ORBITING SATELLITE.
Arizona State Univ., Tempe.
L. Meirovitch, and F. B. Wallace, Jr.. Jan 67, 222p
NASA-CR-665
Contract NGR-03-001-014

Descriptors: *Circular orbit, *Elliptical orbit, *Motion stability, *Passive satellite, *Satellite attitude control, *Spin stabilization, Asymptote, Attitude, Body, Circular, Control, Degree, Dynamics, Ellipticity, Equilibrium, Freedom, Liapunov function, Linear, Method, Motion, Multiple, Nonlinear, Orbit, Passive, Resonance, Rigid, Satellite, Spin, Stability, System, Unsymmetrical.

For abstract, see STAR 05 06.
N67-16665 HC$3.00 MF$0.65

22D. SPACECRAFT LAUNCH VEHICLES AND GROUND SUPPORT

EXPOSURE PREDICTIONS FOR GEODETIC SATELLITE PHOTOGRAPHY BY STELLAR PHOTOMETRY.
EG and G, Inc., Bedford, Mass.
P. T. Gates. 30 Nov 66, 42p Scientific-1, B-3458
AFCRL-66-810
Contract AF 19 (628)-5139

Descriptors: (*Astronomical geodesics, Beacon lights), (*Satellites (Artificial), *Photometers), Astronomical cameras, Photographic images, Stars, Light, Wave transmission, Atmosphere, Background, Radiometers, Scientific satellites.
Identifiers: Geophysical satellites.

A stellar telephotometer was designed for on-site use at stations photographing satellites with Xenon beacons. Through photometric measurement of known star in the photographic field, predictions may be made of beacon exposure through the existing atmosphere. The report presents the radiometric basis for the measurements and techniques used to correlate photometric readings with plate exposures. (Author)
AD-646 878 HC$3.00 MF$0.65

THE DIFFERENCE FREQUENCY COULOMETER.
Technical memo.,
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
D. P. Peletier. Sep 66, 59p TG-857
Contract NOw-62-0604

Descriptors: (*Batteries + components, Spaceborne), (*Monitors, Batteries + components), (*Measuring devices (Electrical + electronic), Batteries + components), Satellites (Artificial), Electric currents, Telemetering data, Circuits, Input-output devices, Counting methods, Oscillators, Resistors.
Identifiers: Coulometers.

A ground test system, continuously integrating the current through a satellite battery to obtain accurate charge data which is printed in tape form, is described. The data indicates the magnitude and direction of the charge transferred between printouts. The accuracy of the system is 0.1% rms full scale. System concepts, characteristics, circuit considerations, and calibration procedures are included. (Author)
AD-646 903 HC$3.00 MF$0.65

U. S. NAVY DOPPLER TRACKING SYSTEM TRANET.
Technical memo.,
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
C. A. Dunnell. Dec 66, 37p TG-874
Contract NOw-62-0604

Descriptors: (*Satellite tracking systems, *Doppler systems), (*Astronomical geodesics, Satellite tracking systems), (*Navigation satellites, Satellite tracking systems), Satellite networks, Radar tracking, Portable, Data processing systems, Time, Frequency, Standards, Very low frequency, Clocks, Ground support equipment, Control systems, Accuracy.
Identifiers: Tranet.

The TRANET satellite tracking network of radar receiving stations and other facilities acquires and processes doppler-frequency shift data from the signals of suitably equipped near-earth satellites. A small man-portable station, currently under development, will ultimately replace the van-mounted stations. The system is capable of handling 40 to 50 passes per station per day or between 480 and 600 passes per day for the basic network of earth stations. As many as ten satellites can be handled by full-time operation of the network and still maintain maximum accuracy. Data attrition from all causes is below 10 percent. The APL Time-and-Frequency Laboratory generates signals that are used by the TRANET stations to ensure the accuracy of their time and frequency standards. The TRANET Control Center serves as the hub of the TRANET network. It receives data from the stations and advises the stations on the status of the satellites and of their performance. Data from the Control Center are reduced by the APL Computing Center and by the Naval Weapons Laboratory. TRANET provides high-density high-accuracy data for a large number of satellites in a form ready for the computing process. Currently TRANET measures doppler frequency with an accuracy of one part in 10 to the 11th power and satellite position with an accuracy of 10 meters. (Author)
AD-646 904 HC$3.00 MF$0.65

* U.S. GOVERNMENT PRINTING OFFICE : 1967 OL—252-093 (19)

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11B AD-147 969
6E AD-218 859
15E AD-220 605
5C AD-224 286
5E AD-240 002
21E AD-254 750
9E AD-270 503
20L AD-417 657
5A AD-431 331
17D AD-432 026
11B AD-434 108
20G AD-440 937
17I AD-442 524
20E AD-452 584
9E AD-453 129
11F AD-458 529
19A AD-459 600
7D AD-459 649
11E AD-464 235
20B AD-464 350
10A AD-465 704
1A AD-466 922
12A AD-467 119
20M AD-467 519
20M AD-469 851
5D AD-474 037
7C AD-474 501
20D AD-475 428
5J AD-479 612
5I AD-50 299
20K AD-59 193
4A AD-646 355
4B AD-646 356
4B AD-646 357
16A AD-646 358
5J AD-646 360
7C AD-646 362
13J AD-646 363
12A AD-646 364
16D AD-646 365
17I AD-646 366
1D AD-646 367
13J AD-646 368
9E AD-646 369
9C AD-646 370
9C AD-646 371
3B AD-646 372
5J AD-646 373
7C AD-646 374
20M AD-646 375
20F AD-646 376
14E AD-646 378
13H AD-646 379
20D AD-646 380
11C AD-646 381
21D AD-646 382
11C AD-646 383
20D AD-646 384
19F AD-646 385
20M AD-646 387
14B AD-646 388
20K AD-646 389
5A AD-646 390
6M AD-646 391
5J AD-646 392
9B AD-646 393
7C AD-646 394
9B AD-646 395
20L AD-646 396
20D AD-646 397
20D AD-646 398
20L AD-646 399
6B AD-646 400
12B AD-646 401
7C AD-646 402
12B AD-646 403
8G AD-646 404
8B AD-646 405
20G AD-646 406
20J AD-646 407
20C AD-646 408
20J AD-646 409
20J AD-646 410
9A AD-646 411
20L AD-646 412
20L AD-646 413
6B AD-646 414
12B AD-646 415
7C AD-646 416
12B AD-646 417
6C AD-646 418
20D AD-646 419
13M AD-646 420
21I AD-646 421
7C AD-646 422
20K AD-646 423
11F AD-646 424
21B AD-646 426
6C AD-646 430
20K AD-646 431
6A AD-646 432
20L AD-646 433
20J AD-646 434
20K AD-646 435
20D AD-646 436
14E AD-646 437
15E AD-646 438
20L AD-646 439
21D AD-646 440
9E AD-646 441
5F AD-646 442
5E AD-646 443
12I AD-646 444
20L AD-646 445
3E AD-646 446
11I AD-646 447
11F AD-646 448
3C AD-646 449
20K AD-646 450
6R AD-646 451
20L AD-646 452
20D AD-646 453
20C AD-646 454
11F AD-646 455
7D AD-646 456
19D AD-646 457
18H AD-646 458
5E AD-646 459
20D AD-646 460
6S AD-646 461
6M AD-646 462
5I AD-646 463
1C AD-646 464
4A AD-646 465
8A AD-646 466
6P AD-646 467
6E AD-646 468
13C AD-646 469
6E AD-646 470
9D AD-646 471
9D AD-646 472
9D AD-646 473
20D AD-646 474
20D AD-646 475
20I AD-646 476
7B AD-646 477
20L AD-646 478
20L AD-646 479
9D AD-646 480
11F AD-646 481
20N AD-646 482
20L AD-646 483
20L AD-646 484
20C AD-646 485
17I AD-646 486
20N AD-646 487
12A AD-646 488
20B AD-646 489
20L AD-646 490
9E AD-646 491
7D AD-646 492
5J AD-646 493
6S AD-646 494
19A AD-646 495
17A AD-646 496
5A AD-646 497
6T AD-646 498
20D AD-646 499
13L AD-646 500
8C AD-646 501
13C AD-646 502
20D AD-646 503
6O AD-646 504
6E AD-646 505
9B AD-646 506
11F AD-646 508
8C AD-646 509
5J AD-646 510
12A AD-646 511
6S AD-646 512
11F AD-646 513
8F AD-646 514
20F AD-646 515
8K AD-646 516
19G AD-646 517
20H AD-646 518
13I AD-646 519
11F AD-646 520
17G AD-646 521
8G AD-646 522
9A AD-646 523
9A AD-646 524
9A AD-646 525
13I AD-646 526
11I AD-646 527
17B AD-646 528
9A AD-646 529
9A AD-646 530
11I AD-646 531
9A AD-646 532
9A AD-646 533
17B AD-646 534
11J AD-646 535
9A AD-646 536
9A AD-646 537
9A AD-646 538
11J AD-646 539
9A AD-646 540
17B AD-646 541
17B AD-646 542
17B AD-646 543
9A AD-646 544
11I AD-646 545
9A AD-646 546
9A AD-646 547
9A AD-646 548
11I AD-646 549
12A AD-646 550
12B AD-646 551
12B AD-646 552
12B AD-646 553
9D AD-646 554
22A AD-646 555
6T AD-646 556
6C AD-646 557
20D AD-646 558
21B AD-646 559
12A AD-646 560
17G AD-646 561
11L AD-646 562
2F AD-646 563
14B AD-646 564
11I AD-646 565
11L AD-646 566
2F AD-646 567
2F AD-646 568
13M AD-646 569
11I AD-646 570
20J AD-646 571
20H AD-646 572
8K AD-646 573
13M AD-646 574
6P AD-646 575
7C AD-646 576
12A AD-646 577
1C AD-646 578
11F AD-646 579
11F AD-646 580
6S AD-646 581
20J AD-646 582
6R AD-646 583
4A AD-646 584
6M AD-646 585
7D AD-646 586
6U AD-646 587
18H AD-646 588
20I AD-646 589
7D AD-646 590
13F AD-646 591
9E AD-646 592
9B AD-646 593
7D AD-646 594
13M AD-646 595
5C AD-646 596
9C AD-646 597
5G AD-646 598
21E AD-646 599
16A AD-646 600
19A AD-646 601
20B AD-646 602
7B AD-646 603
7E AD-646 604
4B AD-646 605
4B AD-646 606
7B AD-646 607
13K AD-646 608
20K AD-646 609
8G AD-646 610
20I AD-646 611
4A AD-646 612

17B AD-646 613
20J AD-646 614
19I AD-646 615
11B AD-646 616
8D AD-646 617
4D AD-646 61A
20F AD-646 619
20L AD-646 620
20N AD-646 621
5C AD-646 622
20N AD-646 623
6P AD-646 624
8B AD-646 625
7E AD-646 626
15C AD-646 627
12A AD-646 628
9E AD-646 629
20H AD-646 630
19A AD-646 631
12A AD-646 632
16D AD-646 633
5A AD-646 634
21F AD-646 635
10C AD-646 636
7D AD-646 637
6L AD-646 638
13M AD-646 639
8E AD-646 640
7F AD-646 641
6H AD-646 642
20D AD-646 643
17G AD-646 644
7F AD-646 645
20B AD-646 646
20K AD-646 647
13I AD-646 648
20N AD-646 649
1C AD-646 650
5I AD-646 651
5I AD-646 652
5I AD-646 653
20L AD-646 654
9C AD-646 655
20C AD-646 656
7F AD-646 657
20A AD-646 658
22A AD-646 659
5H AD-646 660
4B AD-646 661
18J AD-646 662
5B AD-646 663
20M AD-646 664
20D AD-646 665
6E AD-646 666
6P AD-646 667
17I AD-646 668
7D AD-646 669
22A AD-646 670
5F AD-646 671
20I AD-646 672
7F AD-646 673
7D AD-646 674
7D AD-646 675
1C AD-646 676
17I AD-646 677
13J AD-646 67A
4A AD-646 679
20K AD-646 680
5F AD-646 681
20B AD-646 682
6B AD-646 683
2E AD-646 684
6P AD-646 685
6P AD-646 686
6E AD-646 687
6P AD-646 688
6A AD-646 689
6P AD-646 690
20K AD-646 691
6A AD-646 692
13M AD-646 693
6A AD-646 694
12B AD-646 695
6L AD-646 696
6A AD-646 697
6S AD-646 698
11H AD-646 699
4B AD-646 700
5J AD-646 701
18R AD-646 702
8G AD-646 703
6C AD-646 704
5J AD-646 705
5J AD-646 706
20D AD-646 707
5I AD-646 708
20K AD-646 709
20M AD-646 710
11I AD-646 711
9H AD-646 712
9F AD-646 713
14B AD-646 714
17A AD-646 715
5E AD-646 716
9B AD-646 717
4A AD-646 718
12A AD-646 719
5C AD-646 720
AJ AD-646 721
14B AD-646 722
5C AD-646 723
8I AD-646 724
9E AD-646 725
9E AD-646 726
4B AD-646 727
60 AD-646 728
13J AD-646 729
19A AD-646 730
22B AD-646 731
20E AD-646 732
11F AD-646 733
14B AD-646 734
20I AD-646 735
15C AD-646 736
9A AD-646 737
17J AD-646 738
7D AD-646 739
10B AD-646 740
13M AD-646 741
5A AD-646 742
20D AD-646 743
20E AD-646 744
7B AD-646 745
17J AD-646 746
20D AD-646 747
14B AD-646 748
19H AD-646 749
11J AD-646 750
6C AD-646 751
20C AD-646 752
17G AD-646 753
20B AD-646 754
20D AD-646 755
5A AD-646 756
7D AD-646 757
21I AD-646 758
20A AD-646 759
19D AD-646 760
12A AD-646 761
9F AD-646 762
9B AD-646 763
6P AD-646 764
5I AD-646 765
17B AD-646 766
5I AD-646 767
5J AD-646 768
22H AD-646 769
5I AD-646 770
5J AD-646 771
20I AD-646 772
5I AD-646 773
6J AD-646 774
20C AD-646 775
8K AD-646 776
20G AD-646 777
7D AD-646 778
9D AD-646 779
17B AD-646 77A
8G AD-646 77B
13M AD-646 77C
20H AD-646 77D
3B AD-646 77E
3B AD-646 77F
20H AD-646 780
8K AD-646 781
5A AD-646 782
20A AD-646 783
12A AD-646 784
13K AD-646 785
6E AD-646 786
8G AD-646 787
9B AD-646 788
9B AD-646 789
5J AD-646 78A
5I AD-646 78B
12B AD-646 78C
20L AD-646 78D
12A AD-646 78E
7C AD-646 78F
11H AD-646 790
7D AD-646 791
1C AD-646 792
13M AD-646 793
11F AD-646 794
13I AD-646 795
5J AD-646 796
3B AD-646 797
22C AD-646 798
12A AD-646 799
22B AD-646 79A
5J AD-646 79B
6P AD-646 79C
6P AD-646 79D
8H AD-646 79E
20F AD-646 79F
20L AD-646 7A0
9B AD-646 7A1
14C AD-646 7A2
6D AD-646 7A3
6S AD-646 7A4
6A AD-646 7A5
8C AD-646 7A6
20L AD-646 7A7
20H AD-646 7A8
12B AD-646 7A9
20E AD-646 7AA
20F AD-646 7AB
20D AD-646 7AC
12A AD-646 7AD
20L AD-646 7AE
20F AD-646 7AF
9A AD-646 7B0
12A AD-646 7B1
3B AD-646 7B2
6F AD-646 7B3
12A AD-646 7B4
1C AD-646 7B5
5J AD-646 7B6
5A AD-646 7B7
6P AD-646 7B8
13M AD-646 847
6P AD-646 848
3B AD-646 849
7D AD-646 850
5A AD-646 851
12A AD-646 852
17I AD-646 853
19A AD-646 854
20N AD-646 855
17B AD-646 856
9B AD-646 857
13J AD-646 858
6E AD-646 859
13M AD-646 860
17A AD-646 861
19D AD-646 862
9B AD-646 863
20B AD-646 864
8G AD-646 865
9B AD-646 866
9B AD-646 867
9B AD-646 868
7D AD-646 869
9B AD-646 870
6S AD-646 871
6E AD-646 872
7D AD-646 873
17I AD-646 874
9D AD-646 875
9D AD-646 876
9E AD-646 877
22D AD-646 878
11B AD-646 879
9B AD-646 880
8E AD-646 881
13M AD-646 882
20M AD-646 883
20F AD-646 884
6E AD-646 885
20B AD-646 886
20D AD-646 887
20K AD-646 888
20I AD-646 889
6F AD-646 890
20I AD-646 891
8A AD-646 892
5B AD-646 893
4B AD-646 894
9B AD-646 895
11H AD-646 896
7D AD-646 897
9C AD-646 898
15B AD-646 899
20N AD-646 900
12A AD-646 901
7C AD-646 902
22D AD-646 903
22D AD-646 904
17I AD-646 905
17I AD-646 906
8J AD-646 907
8J AD-646 908
20C AD-646 909
20K AD-646 910
20A AD-646 911
9E AD-646 912
17G AD-646 913
9A AD-646 914
11I AD-646 915
8F AD-646 916
20K AD-646 917
5A AD-646 918
11D AD-646 919
6F AD-646 920
6K AD-646 921
6C AD-646 922
22C AD-646 923
7A AD-646 924

11S AD-646 925
12B AD-646 926
17E AD-646 927
20K AD-646 928
6P AD-646 929
20G AD-646 930
20I AD-646 931
13I AD-646 932
13H AD-646 933
17G AD-646 934
7D AD-646 935
20J AD-646 936
20J AD-646 937
16U AD-81 151
1AB AEC-TR-6609
20H AEC-TR-6807
1AD ANL-6948
1AI ANL-7001
18H ANL-7044
7A ANL-7125
1AI ANL-7158
18D ANL-7243
1AI AMI-1779
1AI BNWL-308
4F BNWL-317
18H CEX-63.6.1
6H COO-1283-40
1AJ IDO-14678
20H IS-1448
7A LA-3539
1AI LA-3570-MS
7B LA-3594
11F LA-3599
18D LA-3620-MS
11F MCW-1505
20H MLM-1251
20G MURA-723
41F NAA-SR-11034
12A NBS-MONO-98
7D NBS-TN-278
14B NBS-TN-308
14B NBS-TN-345
9C NBS-TN-411
1AB NYO-2983-1
20M N63-83586
21C N65-84242
AK N67-15354
1A N67-15384
20H N67-15386
11B N67-15390
9B N67-15391
3A N67-15400
AK N67-15421
20K N67-15428
22A N67-15429
6C N67-15430
3B N67-15441
21I N67-15455
9F N67-15456
20F N67-15457
20I N67-15458
4B N67-15461
3B N67-15484
20D N67-15523
9F N67-15524
6B N67-15550
9F N67-15551
20D N67-15552
6B N67-15553
12A N67-15554
20K N67-15556
7BB N67-15557
13I N67-15558
1A N67-15559
6A N67-15560
5J N67-15660
20K N67-15662
1A N67-15664
20D N67-15665
21A N67-15666
20L N67-15668
22B N67-15669
14B N67-15670
20K N67-15671
14B N67-15673
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11F N67-15683
9A N67-15684
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20H N67-15686
6A N67-15687
20I N67-15688
7B N67-15690
10A N67-15691
20K N67-15692
1A N67-15693
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12A N67-15695
20I N67-15696
20D N67-15698
1A N67-15699
6S N67-15700
22A N67-15701
9D N67-15762
20D N67-15765
22B N67-15781
7D N67-15831
1A N67-15832
11F N67-15833
20I N67-15841
1A N67-15842
18D N67-15843
20D N67-15844
20I N67-15845
22A N67-15846
11B N67-15881
9B N67-15882
4A N67-15883
9F N67-15890
20H N67-15900
9F N67-15901
10A N67-15940
6E N67-15941
1A N67-15957
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21I N67-15959
20I N67-15960
13L N67-15981
20N N67-16001
12A N67-16010
5H N67-16011
5H N67-16012
21F N67-16013
22A N67-16021
14B N67-16041
13H N67-16042
7D N67-16043
20M N67-16044
20M N67-16045
22B N67-16046
21H N67-16047
13I N67-16048
21H N67-16050
22B N67-16051
22B N67-16052
22B N67-16053
17B N67-16054
22A N67-16056
9F N67-16057
20A N67-16058
9C N67-16061
7E N67-16074
1D N67-16194
6A N67-16434
9A N67-16437
20H N67-16501
7D N67-16502
6M N67-16503
4A N67-16505
22B N67-16506
4A N67-16507
4A N67-16508
13H N67-16509
20L N67-16510
4A N67-16511
22A N67-16512
20M N67-16513
3B N67-16515
20J N67-16519
18F N67-16540
13H N67-16541
20D N67-16542
22H N67-16543
10B N67-16544
6M N67-16545
14B N67-16546
20F N67-16547
4A N67-16548
22C N67-16549
4A N67-16550
22A N67-16551
4A N67-16552
7D N67-16553
6S N67-16554
20M N67-16556
9B N67-16557
20I N67-16558
21I N67-16559
9D N67-16560
22A N67-16561
10A N67-16562
10A N67-16563
11F N67-16564
10A N67-16565
20L N67-16566
20M N67-16567
20M N67-16568
20M N67-16569
20M N67-16570
20M N67-16571
11F N67-16572
22C N67-16573
22C N67-16574
22A N67-16575
22A N67-16576
22A N67-16577
22A N67-16578
22A N67-16579
22A N67-16580
22C N67-16603
21H N67-16605
11F N67-16606
6C N67-16608
10C N67-16609
6C N67-16610
6A N67-16611
13H N67-16614
7D N67-16616
22C N67-16617
20I N67-16618
3B N67-16619
20M N67-16620
10B N67-16628
20H N67-16629
20F N67-16630
7D N67-16631
18D N67-16632
20E N67-16633
9F N67-16634
9A N67-16635
5H N67-16661
20A N67-16662
20K N67-16663
20K N67-16664
22C N67-16665
9C N67-16666
9F N67-16668
20D N67-16669
14D N67-16670
4A N67-16671
20K N67-16672
11F N67-16673
9D N67-16674
20D N67-16675
13K N67-16676
11D N67-16677
21B N67-16678
10A N67-16679
10A N67-16680
4B N67-16681
1C N67-16684
9A N67-16685
20M N67-16686
20K N67-16688
20K N67-16689
21B N67-16690
20M N67-16691
20C N67-16692
13I N67-16693
10A N67-16694
22B N67-16695
10C N67-16697
17A N67-16698
8G N67-16700
18I ORNL-TM-1618 PART 1
18I ORNL-4015
11F ORNL-4028
18I ORNL-4034
18D ORO-3224-6
5B PB-172 870-G
5B PB-173 510
8M PB-173 637
13F PB-173 646
13F PB-173 649
9E PB-173 913
6D PB-173 976
6D PB-173 977
6R PB-173 978
6D PB-173 979
6D PB-173 980
13B PB-173 983
6F PB-173 984
5A PB-173 988
5B PB-173 989
4B PB-173 990
20N PB-173 991
4A PB-173 992
21B PB-173 993
13B PB-173 994
5B PB-173 995
4B PB-173 996
20D PB-173 997
4A PB-173 998
4A PB-173 999
4A PB-174 000
4A PB-174 001
8J PB-174 002
8J PB-174 003
8J PB-174 004
13B PB-174 005
13M PB-174 006
11B PB-174 007
13B PB-174 008
5A PB-174 009
13B PB-174 010
11B PB-174 011
13M PB-174 012
13B PB-174 013
13B PB-174 014

13W	PB-174 015	20H	PB-174 040	5D	PB-174 066	17I	PB-174 091
13R	PB-174 016	20F	PB-174 041	5D	PB-174 067	17I	PB-174 092
13R	PB-174 017	20L	PB-174 042	5D	PB-174 068	17I	PB-174 093
8H	PB-174 018	20H	PB-174 043	6E	PB-174 069	17I	PB-174 094
13W	PB-174 019	6A	PB-174 044	6W	PB-174 070	13W	PB-174 095
13R	PB-174 020	19K	PB-174 045	6W	PB-174 071	13W	PB-174 096
13F	PB-174 021	14B	PB-174 046	6W	PB-174 072	13W	PB-174 097
13J	PB-174 022	20I	PB-174 047	13I	PB-174 073	13W	PB-174 098
14B	PB-174 023	20H	PB-174 048	13I	PB-174 074	1C	PB-174 099
20W	PB-174 024	19K	PB-174 049	6L	PB-174 075	13I	AEC-737
14B	PB-174 025	8Q	PB-174 050	8K	PB-174 076	18J	AEC-799
20W	PB-174 026	20N	PB-174 051	8K	PB-174 077	6H	BLO-1951-1
20W	PB-174 027	4A	PB-174 053	13J	PB-174 078	8G	SC-RR-66-58
19K	PB-174 028	20W	PB-174 054	2B	PB-174 079	18D	SC-RR-66-597
11F	PB-174 029	11F	PB-174 055	14B	PB-174 080		
7B	PB-174 030	8I	PB-174 056	9C	PB-174 081	18D	TID-23368
20H	PB-174 031	2F	PB-174 057	5B	PB-174 082	6F	TID-3007(ABS+RACT)
20H	PB-174 032	13J	PB-174 058	8J	PB-174 083	6F	TID-3007(INDEX)
20H	PB-174 033	5C	PB-174 059	8F	PB-174 084	5B	TID-3592
19D	PB-174 034	8F	PB-174 060	13F	PB-174 085	6H	UCD-34PAC-8
7B	PB-174 035	5C	PB-174 061	9A	PB-174 086	7D	UCRL-17175
20I	PB-174 036	5C	PB-174 062	8J	PB-174 087	7D	UCRL-50115
20I	PB-174 037	5C	PB-174 063	13J	PB-174 088	20H	UCRL-50132
20H	PB-174 038	21D	PB-174 064	13J	PB-174 089	6H	UR-2350-2
18I	PB-174 039	5D	PB-174 065	17I	PB-174 090	9F	Y-1568

INDEXES

For Subject, Personal Author, Corporate Author, Contract Number, and Accession/Report Number Indexes to the documents listed in this journal, see Government-Wide Index (67-7), 10 April 1967.

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